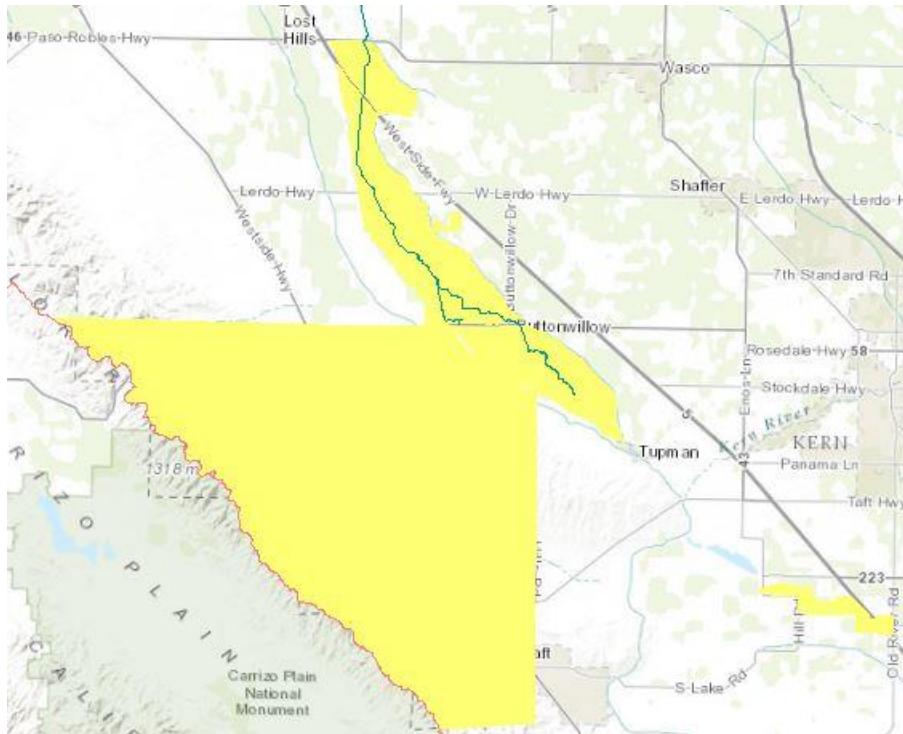


BUENA VISTA COALITION (BVC)

SURFACE WATER MONITORING PLAN

August 2014



R5-201300120

Buena Vista Coalition

525 N. Main St.

Buttonwillow, CA 93206

BUENA VISTA COALITION

Surface Water Monitoring Plan

Table of Contents

Introduction

- I. INTRODUCTION AND HISTORICAL PERSPECTIVE
- II. Floodwaters Testing
- III. Tailwater Testing
- IV. Kern Wildlife Refuge Deliveries
- V. Monitoring Schedule and Frequency
- VI. Monitoring Locations – GPS Coordinates
- VII. Monitoring Parameters
- VIII. Testing Laboratory
- IX. Priorities
- X. Effectiveness of Current Practices
- XI. Data Management
- XII. QAPP – Quality Assurance Project Plan
- XIII. References

Appendix A – Kern River Flood Channel Canal History

Appendix B – Buena Vista Lake Cells 1, 2, 2R

Appendix C – Water Quality Management Plan August 2012, Main Drain

Appendix D – Formal Package Per Management Plan Requesting Removal of a Testing Location, Seventh Standard Road

Appendix E – Quality Assurance Project Plan

Appendix F – BSK and Associates, Statement of Qualification

FIGURES

- 1. 1877 Map of Western Kern County from Surveys and Records
- 2. Kern River Flood Flow Path
 - 2A. Kern River Flood Channel Canal Headgate
 - 2B. Kern River – State Aqueduct Intertie
- 3. Main Drain Canal and Kern River Flood Channel Canal Sub-Watershed
- 4. Ephemeral Test Sites
- 5. Maples Service Area
- 6. Testing Locations for Water Quality Management Plan, August 2012 Main Drain
- 7. Paths of Delivery of Water to Kern Natural Wildlife Refuge

BUENA VISTA COALITION

Surface Water Monitoring Plan

INTRODUCTION AND HISTORICAL PERSPECTIVE

The primary agricultural area of the Buena Vista Coalition (BVC) falls within the historical area known as the Buena Vista Slough, which was also known as part of the Tule Swamp District. This swamp represented the late stage of the Kern River as it made its way to the terminal inland lake-Tulare Lake. Historically, the Kern River water would flow down the river channel as it comes out of the Canyon and began to fill up Kern Lake. At a certain level, water would leave Kern Lake and flow into the Buena Vista Lake, which at normal to high flow will be filled to an optimum elevation for the river to continue its flow north towards Tulare Lake.(See Fig. 1) This historical Kern River flow path towards Tulare Lake went through the area currently called the Buena Vista Water Storage District. BVWSD comprises a major portion of the BVC.

As agriculture developed in the rich soils of the Buena Vista Slough, landowners attempted to control the flooding of the area in the high flow years. The Kern Valley Water Company Canal was built with a levee on its east side to direct flood waters west around the Buena Vista Slough. Over time this canal has become known as the Kern River Flood Channel Canal. To this day it can still receive the flood waters of the Kern River in high flow years. Figure 1 is an 1877 Kern County official map compiled by the Survey office which shows the historic river operation. Also attached as Appendix A is a 1994 Buena Vista Water Storage District (BVWSD) letter to the United States Environmental Protection Agency in regards to the flood channel canal. Attached to this letter is a report filed from the BVWSD to the California State Engineer which details much of the history of the construction of the body which is now known as the Kern River Flood Channel Canal.

With the building of the Lake Isabella Dam, river flow patterns have changed. Both the former Kern Lake and Buena Vista Lake are now farmed, and rarely used for water storage.* Due to the development of additional irrigation facilities and surface water exchanges, Kern River water flow into the flood diversion facilities is typically a once or twice a decade event.

FLOODWATER TESTING

On rare occasions when the flood waters are flowing in the area currently known as the Kern River Flood Channel Canal, the BVC will do ephemeral testing. The scope of this testing will be addressed elsewhere in this document. It does not appear that there are any issues with this channel, or the flows in it. However, it would be nice for it to be tested occasionally to establish a baseline.

- *The Buena Vista Water Storage District still maintains the right and ability to flood cells #1, #2, and #2R of Buena Vista Lake, see Appendix B.*

BUENA VISTA COALITION

Surface Water Monitoring Plan

Kern River water essentially never floods its historical path, mimicked to a large degree by the current Main Drain Canal, rather it flows west of its historical path in the Kern River Flood Channel Canal, see Figure 2, 2A, and 2B. However the Main Drain Canal still has a storm water component of flow. The Main Drain Canal carries the flow associated with the sub-watershed area shown as the Main Drain Canal, Sub Watershed Area, see Figure 3. The Main Drain Canal is subject to a management plan, Water Quality Management Plan, August 2012 Main Drain. This plan does not call for any ephemeral testing, rather just monthly testing, if flow exists. The Buena Vista Coalition

(BVC) thinks ephemeral testing during storm flows is initially appropriate for the Main Drain Canal, in addition to the existing testing program described elsewhere as part of the management plan. The scope of this ephemeral testing is described elsewhere in this document. This too would establish a baseline for storm flows and the sheet run-off across the watershed into the Main Drain Canal.

The ephemeral testing for both the Kern River Flood Channel Canal and the Main Drain Canal would be at Highway 46, the northern boundary of the Coalition. The actual site in the Kern River Flood Channel Canal would be selected by BVC, in working with its lab testing company, subject to the approval of the Regional Board. It is thought this best can be done on the north side of Highway 46. The Main Drain Canal would continue to be tested at the location 1 mile south of Highway 46, but called the Highway 46 testing location, see Figure 4.

The Kern River Channel Canal while carrying flood waters from the Kern River, could receive small sheet surface flows from the BVC lands. It is more likely if it adds additional surface water as it flows north that it will come from lands from the Westside Coalition. The BVC will share its information with the Westside Coalition, and at some point in time it may be determined that some of the testing in the Kern River Flood Channel Canal is the responsibility of the Westside Districts. However initially, the BVC will perform the ephemeral tests on the Kern River Flood Channel.

It should be noted that due to the perched water table, there is often standing water in the Kern River Flood Channel Canal in the area near Highway 46. This standing water will not be tested by the BVC, as it is not significantly influenced by BVC lands, nor is it flowing and joining the waters of the state.

The BVC boundary extends south and west beyond the edge of irrigated agriculture. To date there are no members in this area, comprised primarily of oilfield lands. There are no regularly flowing bodies of water in this portion of lands, nor are there any locations which might indicate they could be locations for ephemeral testing. The BVC will monitor this area for agriculture, as well as any surface flows which might require investigation.

The Maples Service Area is part of the location of the historical flow from the Kern Lake to the Buena Vista Lake. In Figure 1, a portion of the Tule Swamp District between Kern Lake and Buena

Fig: 2

Kern River- Flood Flow Path

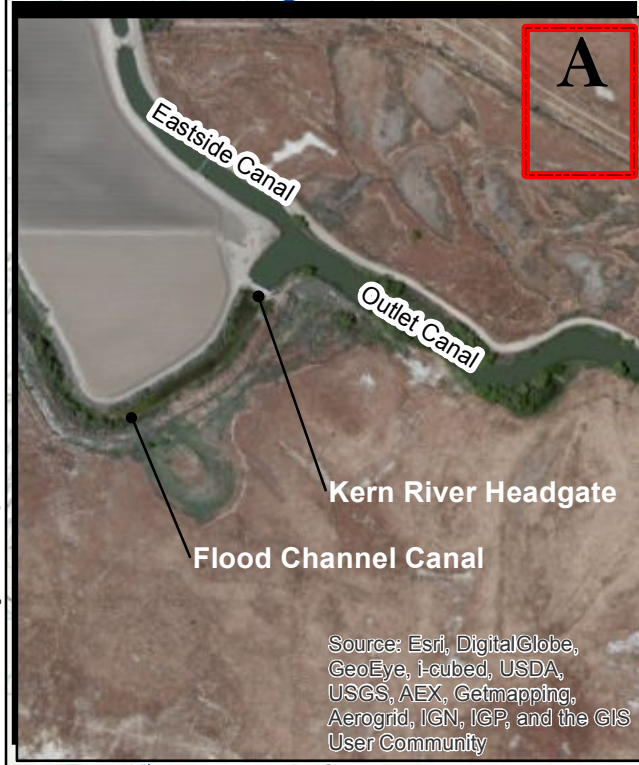
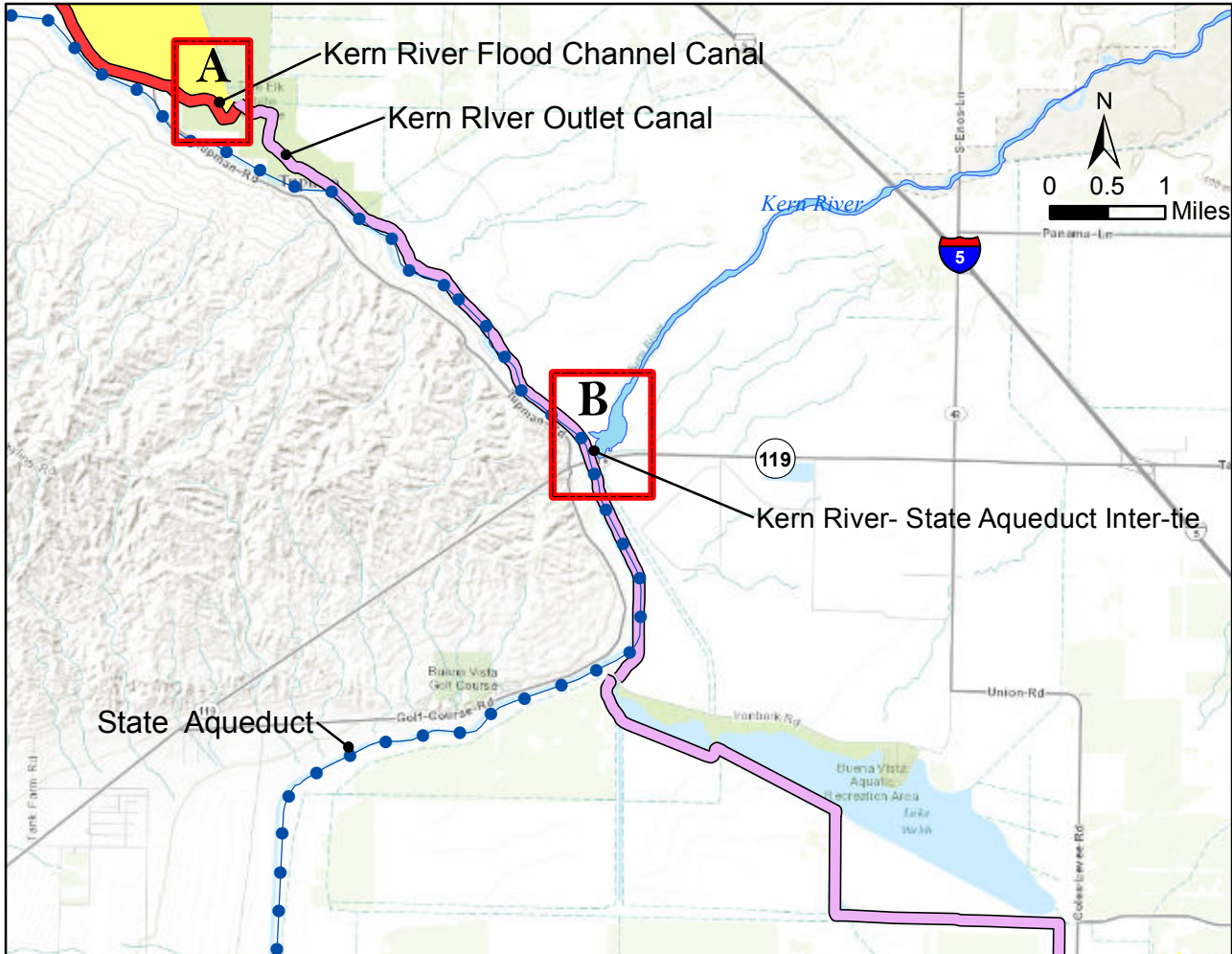


Fig: 2A Kern River Flood Channel Canal Headgate



Fig: 2B Kern River- State Aqueduct Inter-tie

Fig: 3

Main Drain Canal & Kern River Flood Channel Canal Sub-Watershed

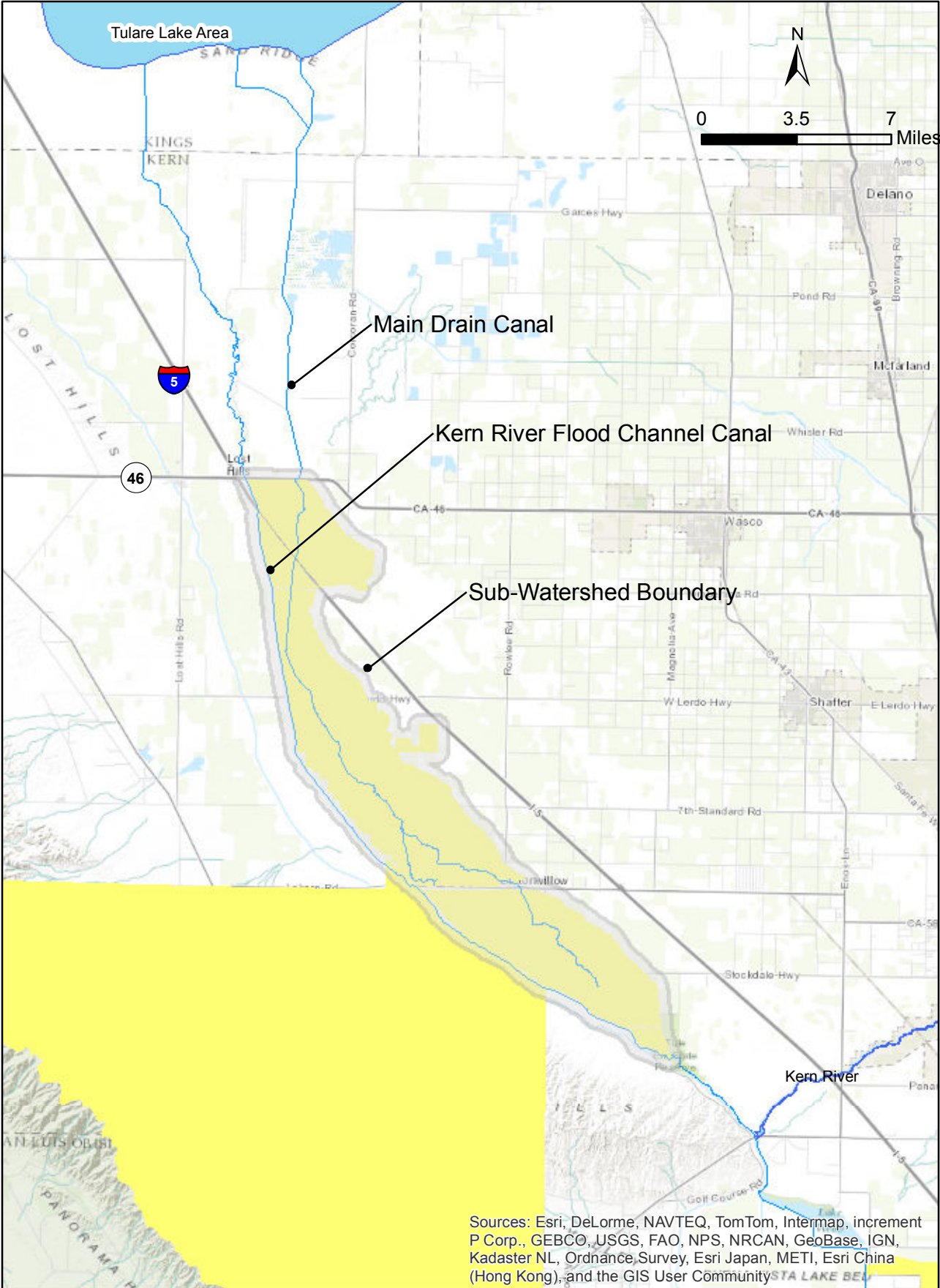


Fig: 4 Ephemeral Test Sites



BUENA VISTA COALITION

Surface Water Monitoring Plan

Vista Lake is what now comprises the Maples Service Area. Since these lakebeds are dry there is no surface flow of significance in the Maples Service Area. In Figure 5 the Maples Service Area is superimposed on a USGS quadrangle map. To the south is the Rim Ditch, and the north bank of the Maples Canal is the Maples Levee. From east to west there is essentially zero fall, as the contour lines are parallel with the Maples Canal. There is no surface run-off in this area. Rainwater which falls in this area essentially builds up on the surface until it soaks into the ground. Percolation into the ground occurs prior to the water building enough head to travel the distances necessary to join any body of surface water.

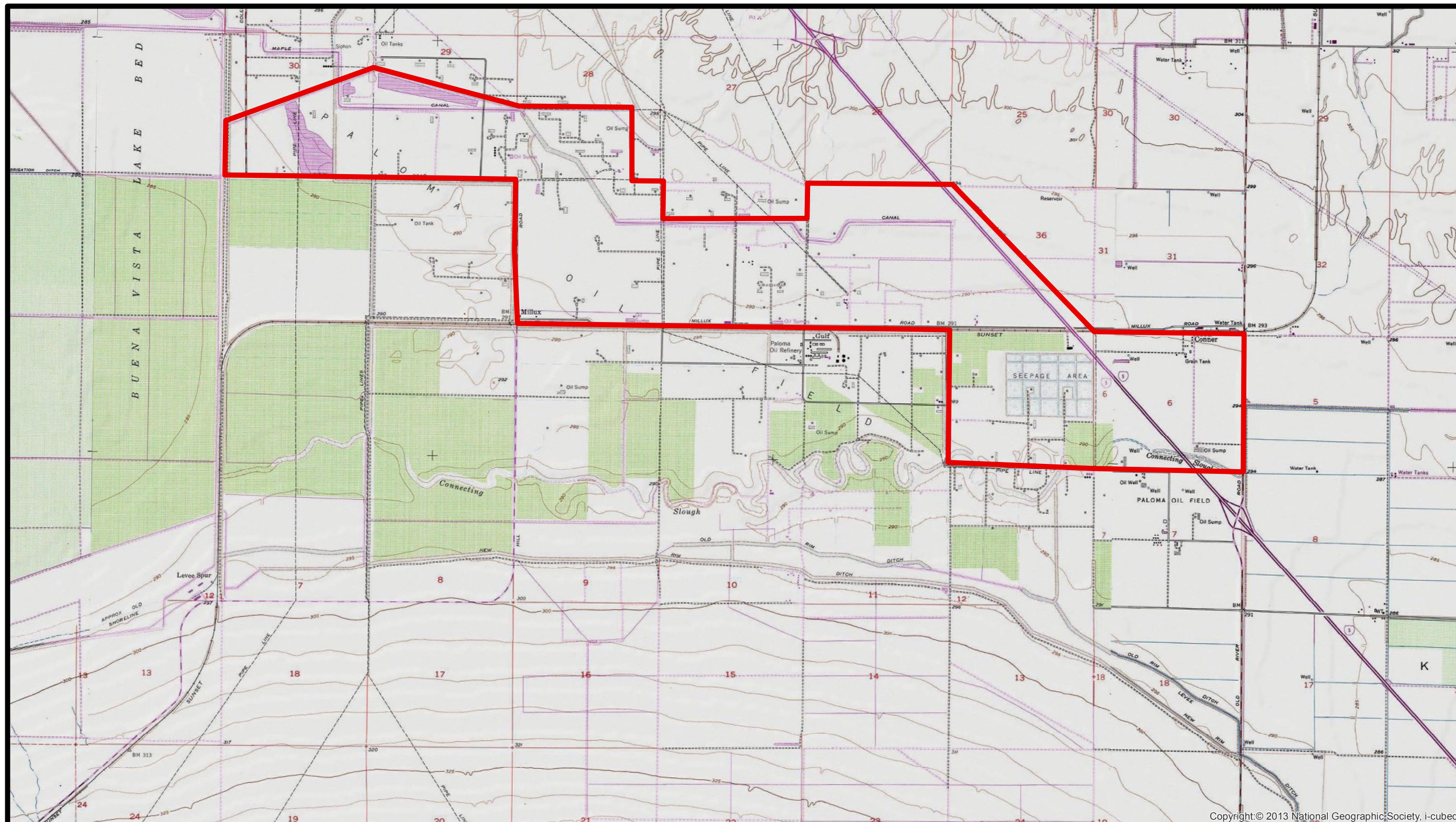
TAILWATER TESTING

The Main Drain Canal, in addition to being the conduit for storm run-off of most of the BVC operates as a tailwater ditch for the Buena Vista Water Storage District farm lands. This tailwater has had numerous occasions when it has left the District area. Once it leaves the District and District control it is considered to be a water of the State, and subject to the requirements of the waste discharge requirements of the current General Order, R5-2013-0120. Under the previous order, and then the previous waiver the flows in the Main Drain Canal had exceedances, which triggered the creation of a management plan, Water Quality Management Plan, August 2012, Main Drain (Management Plan). This management plan, attached as Appendix C, had required testing. Appendix D is an entire separate document which details the history of the testing locations and explains the justification to make a change from the current Management Plan, which has testing at two locations; Main Drain Canal at Seventh Standard Road, and the Main Drain Canal at Highway 46, see Figure 6. With the way the Main Drain Canal has been operated, and due to the success of the BVWSD to not release tailwater into the waters of the state, it seems there is no purpose for the testing at the Main Drain Canal at Seventh Standard Road. This location was used to help locate the source of exceedances, which are somewhat Districtwide. The testing at the Main Drain Canal at Highway 46 would continue until the exceedance issue is determined to be solved.

The BVC feels the monthly testing of tailwater flows, if present, should only occur at the current Highway 46 test site on the Main Drain Canal. The actual site is 1 mile south of Highway 46 on the Main Drain Canal. This is in addition to any storm flows being tested when occurring in the Kern River Flood Channel Canal and in the Main Drain Canal. The testing locations for these flood water tests would be at Highway 46 for the Flood Channel Canal, and the Highway 46 test location for the Main Drain Canal.

KERN WILDLIFE REFUGE DELIVERIES

The Kern Wildlife Refuge typically contracts with BVWSD to wheel water to the Refuge. Historically the BVWSD has delivered this water through the Westside Canal. In 2013 the BVWSD

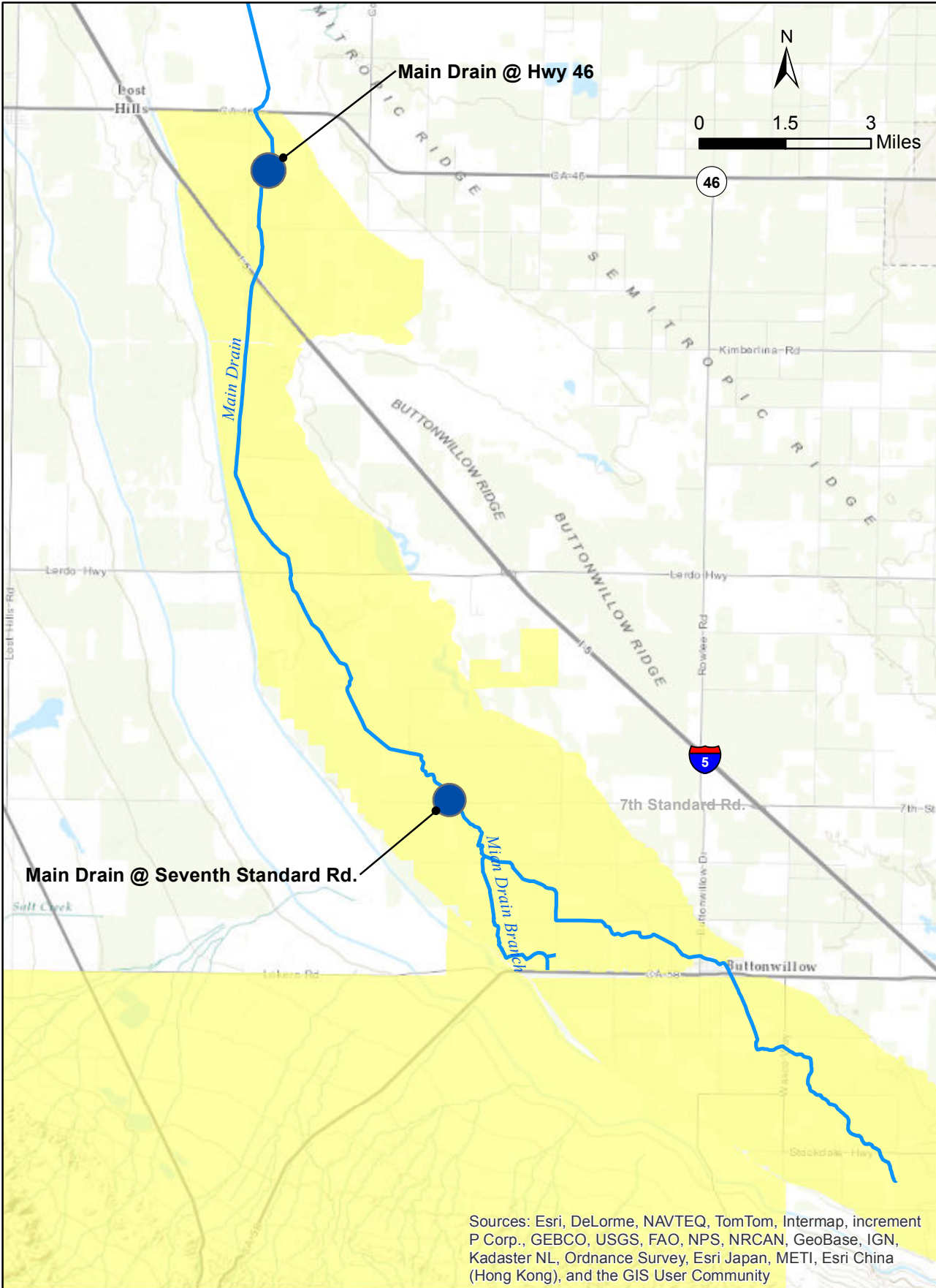


BUENA VISTA WATER STORAGE DISTRICT

FIGURE 5 - MAPLES SERVICE AREA

Fig: 6

Testing Locations for the Main Drain Water Quality Management Plan of Aug 2012



BUENA VISTA COALITION

Surface Water Monitoring Plan

experimented with running the water through the Main Drain Canal. This was selected because it is the lowest point in the District, and it was felt it would impact the perched water table less. The northern lands of the BVWSD have a perched water table, and if allowed to accumulate, the water can greatly reduce this lands ability to be used for crop production. In 2014 the District built a turnout which would allow it to wheel water to the KNWR through the Main Drain Canal, but entering much further north, see Figure 7. Low flows will enter just south of Highway 46, and the higher flows will enter the Main Drain Canal at the Semitropic 120" pipeline.

Since the BVWSD expects to keep all tailwater south of either of these locations, it does not expect to blend any tailwater with the Refuge Water. The BVC does not plan to test water flowing in the Main Drain Canal at Highway 46 if the only water in it is unblended refuge water, supplied from the State Aqueduct. It is unnecessary and a waste of money, as the quality of the State Aqueduct water is known.

MONITORING SCHEDULE AND FREQUENCY

The current monitoring schedule of the Main Drain Canal at Highway 46 is monthly. The testing date is controlled by the lab, usually within the last 1/3 of the month. The testing lab does not notify the BVC that they are testing until they are on-site. If no water is running upon arrival, the testing lab records the conditions with pictures. This is in conformance with the QAPP, the "Water Quality Management Plan – August 2012, Main Drain" and the General Order.

The Main Drain Canal has had fewer flows to test at Highway 46 in the last year. BVC and BVWSD efforts have played a big part in the eliminated flow leaving the District, but with the drought, it has not yet been established that this is a pattern that can be continued. If the tailwater flows leaving the District can be eliminated then it will be time to review the Management Plan.

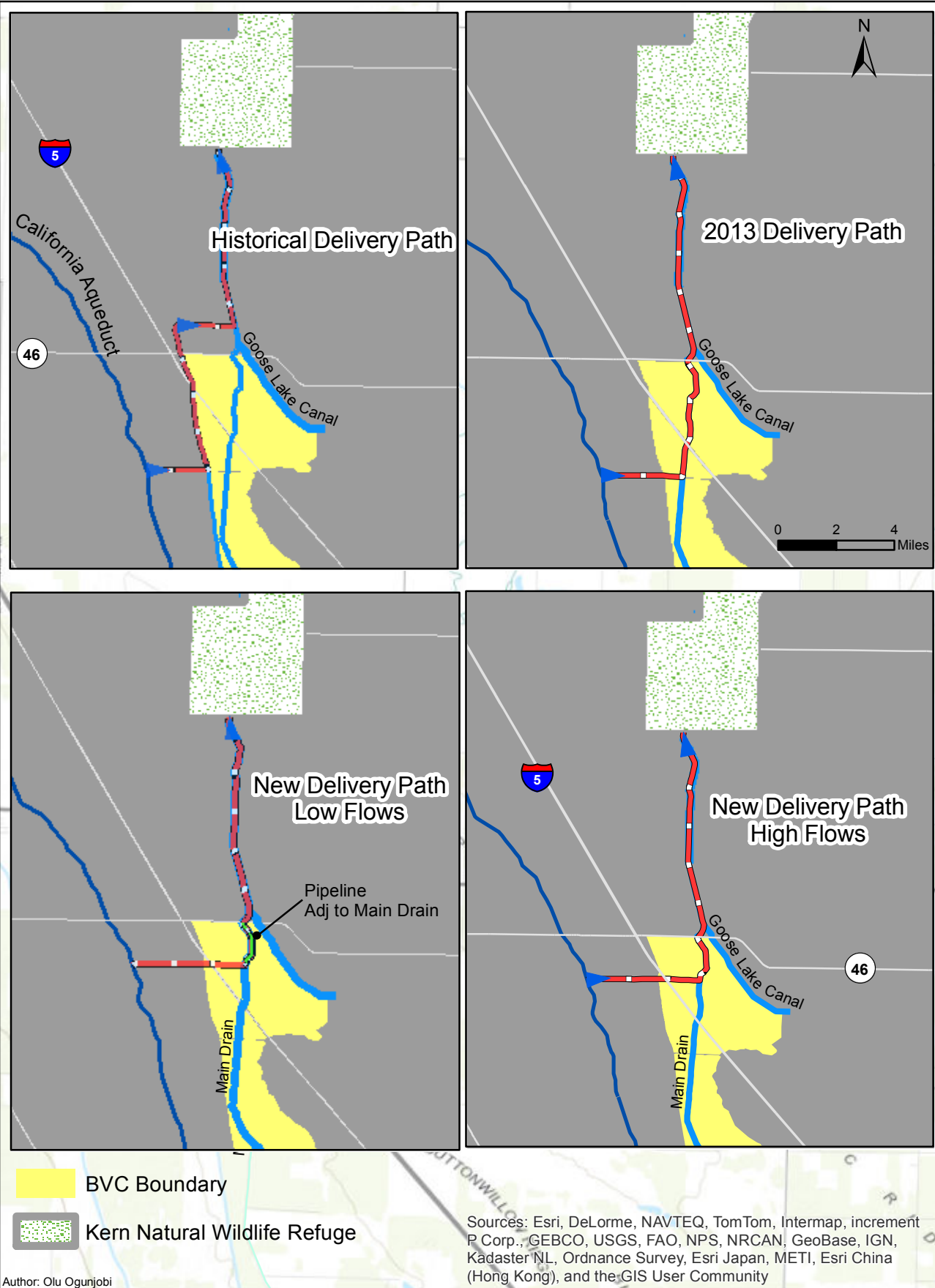
Additionally testing will be performed on the Main Drain Canal when ephemeral water is flowing from storms. This will be tested no more frequently than monthly, and only when storm water is flowing in the Main Drain Canal. The storm water leaving the District will likely have been blended with tailwater in the Main Drain Canal, justifying this additional testing, to observe the flows.

The Kern River Flood Channel Canal at Highway 46 will be tested when ephemeral flows occur. It is important to note that this channel often has standing water in it due to the perched water table. The standing water is not what is being tested. The testing is because two types of water could be in the Kern River Flood Channel Canal when it is flowing. One source is Kern River water flowing around the BVWSD. It is expected that this water would be rather clean and high quality water. The second source for ephemeral flows would be sheet surface run-off from the west. As this water would flow over cropland prior to entering into the Kern River Flood Channel Canal it is the type of water to be sampled and be used to build a data base.

Although the Order considers alternating the assessment testing locations over three years, there will be no rotating of the ephemeral testing on the Kern River Flood Channel Canal and the

Fig: 7

Paths of Water Delivery to the Kern Natural Wildlife Refuge



BUENA VISTA COALITION

Surface Water Monitoring Plan

ephemeral testing on the Main Drain Canal. These flows occur so rarely, that they need to be tested to acquire a data base. If flow patterns change, some type of rotating testing might be more cost effective. But initially, all ephemeral flows will be tested.

As with any other testing site, based on the data observed will determine if the testing needs to be adjusted. No speculation can be made until the first tests are taken and quantified. Theoretically, both the Main Drain Canal and the Kern River Flood Channel Canal can have flows reach the Tulare Lake where they would combine with other waters and become waters of the state. However, as irrigation practices change, spreading operations increase in acreage and improve in operation, and more land is available to park water, these canals may cease to contribute to the waters of the state, and could be eliminated from monitoring completely. Regardless, data will be collected initially, so that a data basis exists. But if it becomes apparent that one or both of these canals no longer reach Waters of the State, then ceasing of testing and monitoring will be considered.

MONITORING LOCATIONS – GPS COORDINATES

The locations of the two test sites are:

Kern River Flood Control Canal (ephemeral) - Longitude -119.648341, Latitude 35.616470

Main Drain Canal (both monthly and ephemeral) – Longitude -119.60970, Latitude 35.60139

MONITORING PARAMETERS

The testing parameters for the Main Drain Canal were established in the Management Plan. These parameters are going to change as part of the new order, however that change has not been finalized yet. Testing will proceed per the previous parameters until new guidelines are established. The specific parameters are identified in the QAPP, see Appendix E.

For simplicity the BVC will begin its ephemeral testing of the Kern River Flood Channel Canal and the ephemeral testing of the Main Drain Canal using the same parameters of the current Water Quality Management Plan – August 2012, Main Drain. This will allow for the best comparison of the differences between the tailwater flows and the ephemeral flows. Due to its close proximity, the same practice will be used at the Kern River Flood Channel Canal. However no testing for soil toxicity will be performed as part of the ephemeral testing program.

TESTING LABORATORY

The BVC is changing testing labs, effective August, 2014. The new lab will be BSK. BSK has performed testing under this Order, R5-2013-0120, for the Kings River Watershed Coalition Authority. It also performed testing for the Southern San Joaquin Valley Water Quality Coalition under the Order R5-2011-0032. See Appendix F for a Statement of Qualifications for BSK.

BUENA VISTA COALITION

Surface Water Monitoring Plan

The BVC has been working with BSK to assume testing responsibility since March of 2014. The BVC has met with BSK at the testing sites, reviewed policies and procedures, toured their laboratory facilities, and has verified their references. The BVC is confident that BSK can help the BVC meet its testing goals and objectives, and submit timely and accurate data which can be absorbed by the RWQCB. BSK's actual proposed processes and procedures will be detailed in the QAPP, later in this report.

BSK uses one other lab as a subcontractor to perform this work, Aquatic Bioassay and Consulting (ABC). ABC is also currently a sub-contractor to the lab which is being replaced by BSK. They will be performing the same work, which is the aquatic toxicity, using the same processes and protocols.

PRIORITIES

The highest Priority both in Monitoring and Managing is the Main Drain Canal Watershed, specifically the Main Drain Canal. The driver in making this the highest priority item is the fact that the Main Drain Canal is used by the BVWSD as a Districtwide tailwater system. Historically this system has had water leave the District and enter waterways of the State, and it has had exceedances. The BVWSD has established a management priority of capturing and reclaiming all waters in the Main Drain Canal and not letting water leave the District. To date the BVWSD has been successful in accomplishing this goal. The BVWSD looks forward to showing it can achieve this goal in wet years as well as the most recent dry years.

The priorities for the water quality parameters in monitoring and managing the Main Drain Canal will be the same defined in the Management Plan. They are:

1. Registered pesticides
2. Toxicity, water and soil
3. Legacy Pesticides
4. DO and PH
5. Salinity

Although these are scheduled to be phased over time, the path that the BVWSD has taken to solve these issues can address all items at the same time. The capture and reclaiming of all the drain water in the Main Drain Canal will accomplish the goals.

The second priority for testing would be the Main Drain Canal ephemeral flows. These flows will likely consist of surface run-off from the farmlands between the Eastside and Westside Canals. The frequency of these events is unknown, nor is the quantity and quality of the run-off. There is no reason to speculate on the quality of the flows in a storm, especially with varying sizes and

BUENA VISTA COALITION

Surface Water Monitoring Plan

durations. Once a few samples have been taken the BVC will be able to decide if this is an area that will benefit from continued monitoring, or even additional efforts.

The third priority will be for testing the ephemeral water flows in the Kern River Flood Channel Canal. These events can be as rare as less than once a decade. It is presumed that the flows in the Kern River Flood Channel Canal will not have much to do with irrigation waters. Only a small percentage of the flow entering from the south at the Kern River Flood Channel Canal headgate, see Figure 2b, would be expected to have had sheet flow across agricultural land, so there should be little influence from irrigated lands. If this assumption is correct after one or two samples it is presumed that this location can be deleted from the testing program. Should the testing raise any issues, then a plan will be developed for the Kern River Flood Channel Canal.

However, there is also a possibility that the Kern River Flood Channel Canal's storm flows when combined with the standing perched water and the surface run-off from the west could impact the water quality. It is for this reason the BVC wants to test this storm water, under varying flow conditions, to have an understanding of what is occurring, and insure there is not a discharge issue.

EFFECTIVENESS OF CURRENT PRACTICES

The current management practice is to capture and reclaim all of the drain water in the Main Drain Canal. The growers in the BVWSD have been very receptive to the concept of 100% capture and reclaim. They have found that this is highly efficient versus running deep wells. They have also found in the northern portions of the BVWSD that the water quality in the Main Drain Canal is often better than their well water. The growers have bought into this practice, and understand how beneficial it is to the BVC for them to not allow any drain water to leave the District. This policy has flowed down through the staffs on the individual farm staffs, so that all involved are working together.

The BVC will continue to educate the growers on the benefits of continuing the practice of 100% capture and reclaim, especially the expanded BVC membership, as several of the new members have lands within the Main Drain Canal Watershed.

No new practices are being considered beyond the 100% capture and reclaim. If this is not sufficient, or the BVC is unable to eliminate drain water flows out of the district, then additional practices will be considered.

DATA MANAGEMENT

The objective of Data Management is to help achieve the goals outlined in the QAPP.

Data production begins with field measurements and sample collection. All notes will be

BUENA VISTA COALITION

Surface Water Monitoring Plan

recorded on bound logbooks. Copies of field documentations will be provided to the analytical laboratory, BSK, for inclusion into the laboratory reports. All anomalies to normal sampling procedures will be noted in the Condition upon Receipts (CUR) and Chain of Command (COC) standard forms. The specific BSK office where the sample crew is dispatched from will maintain the original records for a period of no less than five years, the same as the record retention policy of the laboratory.

The data generated by the laboratory will be produced in electronic format, and held for a minimum of five years from the date of generation. This includes the Laboratory Information Management System database (LIMS) that houses all the results and supporting data associated with the samples. BSK and other sub-contracted laboratories scan all hardcopy records into an electronica archival which is also maintained consistent with the record retention policy.

Hardcopy data is held in a secure location controlled by the laboratory. Access is limited and records are not disposed until all electronic data, including scanned copies of field reports, have been created and properly filed. This is all based on BSK's standard operating procedure, which is included as a part of the QAPP. Electronic data – raw data files, scanned images, PDF reports, etc. – is held on secure company servers that are backed up daily. Backup media is rotated off-site on a scheduled basis, a responsibility of the BSK IT Department.

Data will be provided to the Coalition in electronic format. The analytical report will be in PDF format that includes all results, QC, case narrative, chain of custody and, where required, raw data or data summaries. In addition, the laboratory will create a SWAMP compliant Electronic Data Deliverable (EDD) that includes all required data for the program. This EDD will be verified against the Central Valley Regional Data Center's validation tool for content and structure. A copy of the error report will be provided in conjunction with the file.

Data Management Process by the Coalition involves verifying that the data uploaded online by the different laboratories complies with the QAPP direction for sample analysis and data presentation as well as follows the Electronic Submittal Requirements for Water/Sediment Chemistry Analyses Checklist.

This process includes first confirming that the data are uploaded in the correct CEDEN spreadsheet template. This confirmation is followed by the use of various pivot tables on the original spreadsheets to isolate and confirm that data submittal meet the Electronic Submittal Requirement for Waste/Sediment Chemistry. Help and a checklist is provided on the webpage http://ftp.mpsl.mlml.calstate.edu/CVRDC_LookUpLists.php. As an aside the BVC has found the RWQCB staff to be quite helpful in managing this data, and appreciates the partnering effort the RWQCB staff takes in "getting the data into the system."

The following components of the data are checked for appropriateness; Sample Type Codes, Lab Quality Assurance Samples, Non-Project Samples, Processing and Analysis Information, Analysis Dates and QA Checks. Processing and Analysis Information check being the most critical as it takes care of verifying Sample Prep Date, Sample Digestion/Extraction Date, Lab Batches, Analysis Date as well as Dilution Factors, Results and Result Qualifiers among several others.

BUENA VISTA COALITION

Surface Water Monitoring Plan

If any deficiency is found in the data presentation, the submitting laboratory is notified and asked to review. If it was a data entry error, it is corrected. If it was a process error it is reviewed to judge its significance. The lab will explain the significance of the error and the remedy, if one is required.

BVC will retain indefinitely and in electronic format all data and associated field sheets. The District secure server which is backed up on daily basis is the repository of all data.

QAPP – QUALITY ASSURANCE PROJECT PLAN

The QAPP is the defined process which is to be followed in the taken of the sample, the handling of the sample, the analysis of the sample, and the analysis of the data. The QAPP prepared by BSK for the BVC is found in Appendix E.

The primary goal of any sampling and analysis program is to produce data that is of known and documented quality and is suitable for its intended use. The data generated for this program will be used to make decisions regarding water quality in the State of California, ensuring the preservation of the environment and the protection of human health. To that end, the data quality objectives set forth in this program are established to ensure that (1) the collection of samples is representative of the environmental conditions associated with agricultural activities, that (2) the samples are handled and processed in a manner consistent with the requirements of the methods used and the practices set forth in this QAPP, and that (3) the data generated from this project are of sufficient quality to make sound decisions regarding the impact of agricultural activities on the waters of the State.

There will be modifications to the QAPP, as the Regional Board clarifies some sampling requirements. However this QAPP defines the overall tests and testing processes. The future changes will be minor and require only minor modifications to the QAPP.

BUENA VISTA COALITION

Surface Water Monitoring Plan

REFERENCES

Central Valley Regional Water Control Board, 2013, Irrigated Lands Regulatory Program, General Order, R5-2013-0120,
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0120.pdf

Kern County, Official Map of Kern County, 1888

United States Geological Survey, California-Kern Co., 7.5Minute Series, Belridge, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Buena Vista Lake Bed, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Buttonwillow, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, East Elk Hills, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Hacienda Ranch, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Lokern, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Lone Tree Well, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Lost Hills, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Lost Hills NE, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Lost Hills NW, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Millux, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Semitropic, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, Tupman, 2012

United States Geological Survey, California-Kern Co., 7.5Minute Series, West Elk Hills, 2012

Water Quality Management Plan – August 2012, Main Drain

BUENA VISTA COALITION
Surface Water Monitoring Plan

Appendix A

Kern River Flood Channel Canal History

BUENA VISTA COALITION
Surface Water Monitoring Plan

Appendix B

Buena Vista Lake

Cells 1, 2, 2R

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Surface Water Monitoring Plan

Appendix C

WATER QUALITY MANAGEMENT PLAN, AUGUST 2012

MAIN DRAIN

BUENA VISTA COALITION
Surface Water Monitoring Plan

Appendix D

Formal Package per Management Plan
Requesting Removal of a Testing Location
Seventh Standard Road

BUENA VISTA COALITION
Surface Water Monitoring Plan

Appendix E
QUALITY ASSURANCE PROJECT PLAN
(QAPP)

BUENA VISTA COALITION
Surface Water Monitoring Plan

Appendix F

BSK and ASSOCIATES

STATEMENT OF QUALIFICATION

APPENDIX A

BUENA VISTA WATER STORAGE DISTRICT
525 N. MAIN
BUTTONWILLOW, CALIFORNIA 93206
PHONE (805) 324-1101
(805) 764-5510

DIRECTORS
WALLACE HOUGHIN - PRES.
TERRY CHICCA - V. PRES.
GINO TORIGIANI - SEC.
TOM HURLBUTT
FRANK RICCOMINI

MARTIN N. MILOBAR
ENGINEER-MANAGER
BETTY HARDEN
TREAS/ASST. SECRETARY

March 14, 1994

Ms. Wendy Melgin
U.S. Environmental Protection Agency
Wetlands Permit and Enforcement
75 Hawthorne Street
San Francisco, California 94105-3901

Re: Kern River Flood Channel Maintenance Program

Dear Ms. Melgin:

To follow up on your telephone call on March 11 regarding the above noted subject, I am providing to you some excerpts from the District's Project Report of December 22, 1927 to the State Engineer, Honorable Edward Hyatt, Jr.. I am also providing a copy of a "Map of A Part of Kern County Compiled From Official Surveys & Records - 1877." These disclosures will verify that the Kern River Flood Channel is a canal originating from construction of a levee whose sole purpose was and remains to be to divert Kern River flood flows away from their historic path which was a meandering slough through the Buttonwillow area thus forming a large area of swamp and overflow lands which were reclaimed and now consist of the farmed lands within the Buena Vista Water Storage District.

I believe that this will confirm my explanation. I look forward to meeting with you to answer any further questions that you may have and to showing you the area on Wednesday March 16.

Yours very truly,

BUENA VISTA WATER STORAGE DISTRICT

Martin N. Milobar

Martin N. Milobar
Engineer Manager

Enc.

cc: Mike Nordstrum

REPORT OF BOARD OF DIRECTORS OF
BUENA VISTA WATER STORAGE DISTRICT
TO
HON. EDWARD HYATT, JR. STATE ENGINEER,
UPON
DISTRICT PLAN.

REPORT OF BOARD OF DIRECTORS OF
BUENA VISTA WATER STORAGE DISTRICT
TO
HON. EDWARD HYATT, JR. STATE ENGINEER,
UPON
DISTRICT PLAN.

INTRODUCTION:

In July 1922, a petition was filed for the formation of a district in Kern County under the provisions of the California Water Storage District Act, comprising 125,890 acres of land at present participating in the rights to second point water under the Miller-Haggin agreement, of which 26520 acres comprising reservoir lands not subject to assessment for benefits. A hearing was held before the State Engineer on September 8, 1922, and thereafter a preliminary report was prepared by the writer purporting to show the water supply available, the proposed district service to the included lands and the approximate cost of the project. This report was submitted to the State Engineer and placed in the hands of Mr. S. T. Harding, Consulting Engineer, for analysis. Subsequently Mr. Harding reported his findings and recommendations to the State Engineer in the form of a report entitled "Report on Feasibility of Proposed Buena Vista Water Storage District, Kern County, 125,890 acres prepared for the State

transfer their rights to the District with the agreement that the water shall be distributed in accordance with the rights as they exist. Such agreements have been made with all owners in the District with the exception of the Carmel Cattle Company, which prefers to retain title to its proportion of the water.

This does not alter the operation of the District, as it will merely deliver the water belonging to the Carmel Company as has been done in the past. Copies of agreements under which water rights are to be transferred are given in Appendices D. and E.

FLOOD PROTECTION:

The lands included in the Buena Vista Water Storage District were formerly subject to flood from Kern River. The delta of Kern River begins just below Bakersfield and formerly the first effect of the flood was to fill the bed of Kern Lake and Buena Vista Lake, after which the waters continued through Buena Vista Slough forming a swamp of varying width until finally they emptied into Tulare Lake.

To reclaim this swamp from flood waters a reclamation district was formed in the early seventys and works was started on a flood water canal to carry the water of Kern River past the swamp without flooding the adjacent lands. The various sloughs through the swamp were connected up to make a drainage canal and thereafter the lands were farmed. Subse-

quently the Kern Valley Water Company was formed and stock issued in the amount of 57708 shares, each share representing an acre of reclaimed land. The amount which has been expended on this system is over \$450,000 as shown on the assessment books, but since in every year of flood a great deal of maintenance and repair work has to be done it is impossible to separate the parts of this account chargeable to new construction from those chargeable to maintenance and operation. The ownership of stock in this corporation is in the following proportion:

Miller & Lux	86.064 per cent
Carmel Cattle Co.....	3.955 " "
Kern County Land Co.....	7.763 " "
Wells and successors	1.109 " "
Barnett and successors	1.109 " "

The original flood water canal ended at the north line of Sec. 29, T. 27 S., R. 22 E. and for about 6 miles south from this point the construction was incomplete and inadequate for conveying the flood waters. About 1913 it was decided to continue the canal northward to the Wasco Road and a company was formed called the Kern Valley Reclamation Company to prosecute this work. Due to the faulty nature of the last 6 miles of the Kern Valley Water Company Canal it was decided to reconstruct this part along a new location and thereafter ten miles of flood water canal was constructed sufficient to convey the flood waters of Kern River and discharge them north of the Wasco Road. The proportional interest in the Kern Valley Reclamation Company is as follows:

Miller & Lux	94.37%
Carmel Cattle Company	5.63%

Due to the silting of the bed of Kern River below Bakersfield the channel has raised sufficiently so that at a certain stage of river flow the water leaves its bank on the north side in Sec. 36, T. 29 S., R. 26 E. The flood waters gather themselves in what is known as Jerry Slough running northwesterly and reach Buena Vista swamp at what is known as Goose Lake in T. 27 S., R. 21^W E. In 1910 it was decided that the system of reclamation for the lands in said township and northerly thereof required that the Jerry Slough waters be prevented from entering the swamp, and the Kern Valley Reclamation Company constructed a levee across Goose Lake on the east line of T. 27 S., R. 22 E. and a flood canal, called Goose Lake Canal, running northwesterly and northerly therefrom to convey the waters into Bull Slough and thence into Tulare Lake.

While the above canals are the only ones which can be classified strictly as flood water canals, it may be stated that the East Levee of Buena Vista Reservoir, as well as Cole's Levee and the North Levee constructed under the provisions of the Miller-Maggin agreement, have for one of their objects the reclamation of the lands east of Buena Vista Lake by enabling the flood water of Kern River to be diverted northerly through the Kern Valley Water Company's Canal and by preventing them from backing on to the lands mentioned. Since primarily, however, these works are for the purpose of creating storage in Buena Vista Lake, they will be classified under this head.

ESTIMATE OF COST:

PURCHASE OF EXISTING WORKS:

The works to be purchased consist of the following as specifically listed in the "Report on Valuation of Physical Properties to be acquired by the Buena Vista Water Storage District," hereinbefore referred to:

(1) Flood protection works. These are found to have a reproduction value as follows:

Kern Valley Water Co's properties	\$167,740
Kern Valley Reclamation Co.	
K.V.W. Co. Canal Extension	298,611
Goose Lake Canal	<u>214,494</u>
	\$680,845

These works were primarily built for the reclamation of the lands protected by them and a part, at least, of their cost has been absorbed by the lands in their increased value by reason of reclamation and in their increased production in past years. For this reason arbitrary figures have been fixed, and agreed upon between the owners and the district, for which the properties are to be acquired. These figures are as follows:

Kern Valley Water Company	\$42,000
Kern Valley Reclamation Company.....	<u>128,000</u>
Total	\$170,000

The cost of the acquisition of these works is directly chargeable to the district as a whole. The flood canal of the Kern Valley Water Company was originally designed and constructed to protect all of the swamp and overflow lands down

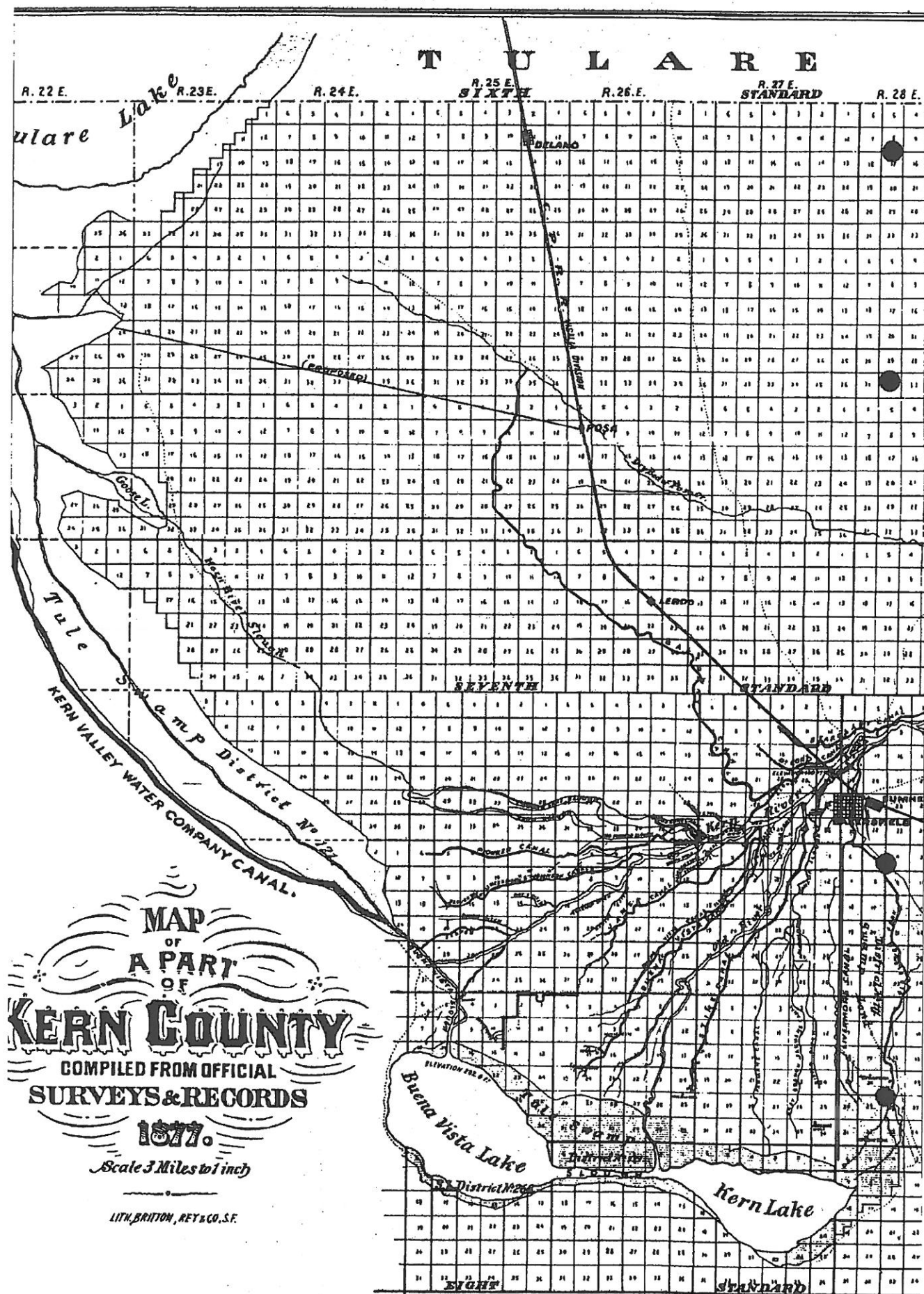
to the original termination of the canal. Were it not for the relief from the flood waters of Kern River afforded by their being taken away by this canal, not only the lands from the beginning of the canal to its termination would be flooded, but likewise lands east of the Buena Vista Reservoir. This was recognized at the time of the incorporation of the Kern Valley Water Company and the 57,708 shares of stock of this company represent the number of acres protected, including all the lands east of the reservoir, some of which are not included in this district, namely about 4,480 acres east of the lake belonging to Kern County Land Company. The work of the Kern Valley Reclamation Company in extending this canal to the Wasco Road was for the specific protection of the lands north of those already protected by the Kern Valley Water Company's Canal, but should be taken with the Kern Valley Water Company's Canal as chargeable to the whole area. Goose Lake Canal was specifically for the protection of the lands in T. 27 S., R. 22 E. but likewise forms a continuation of the drainage system for the whole of Parcel No. 3. It likewise benefits to some extent Parcel No. 4 by being the medium for the conveyance of irrigation water thereto in addition to the flood protection afforded.

An agreement has been drawn between the Kern Valley Water Company and the Buena Vista Water Storage District providing for the conveyance of the properties and is set forth in Appendix A. A similar agreement has been drawn between the Kern Valley Reclamation Company and the district, a copy of which is given in Appendix B.

I, J. E. Woolley, Secretary of the Buena Vista Water Storage District, hereby certify that the above and foregoing report is a true and correct copy of the report of the Board of Directors of the Buena Vista Water Storage District, filed in the office of the State Engineer of the State of California pursuant to the provisions of Section 17 of the Water Storage District Act of the State of California.

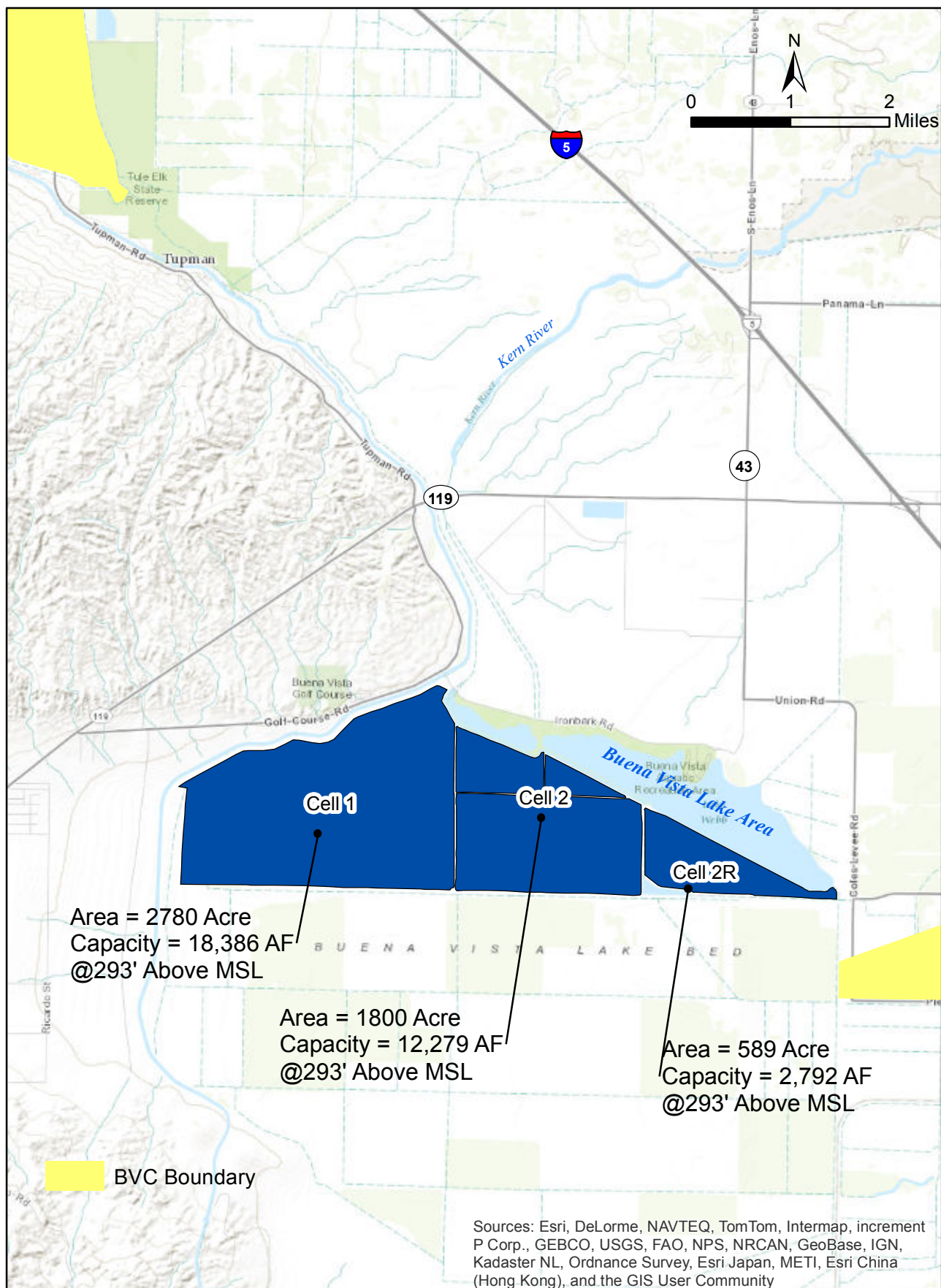
Dated: December 22nd 1927.

J. E. Woolley
Secretary of the Buena Vista
Water Storage District



Appendix B

Map Showing Buena Vista Lake and Flooding Cells



APPENDIX C

Water Quality Management Plan – August 2012 Main Drain



Buena Vista Water Storage District

525 N. Main Street
P.O. Box 756
Buttonwillow, CA 93206

Members of:

Kern River Watershed Coalition Authority
Southern San Joaquin Valley Water Quality Coalition

Water Quality Management Plan – August 2012
Main Drain

Table of Contents

1.	Introduction	2
	a. Purpose	2
	b. Background	2
	c. Watershed Description and Land Uses	2
	d. Summary of Water Quality Exceedances	3
2.	Management Plan Approach for Specific Categories.....	4
	a. Overview	4
	1. Strategy for Identification Agricultural Sources.....	5
	2. Identification of Potential Management Practices.....	5
	Grower Survey Form.....	6
	3. Management Practice Implementation Schedule.....	7
	4. Management Practice Performance Goals.....	7
	5. Effective Monitoring Schedule.....	10
	6. Process and Schedule for Evaluating Management Practice.....	10
	7. Identification of Participants and Coalition Group.....	11
	8. Identified Routine Schedule of Reporting to RWQCB.....	13
	b. Development and Implementation Schedule.....	13
	c. Documentation and Management Plan Reporting	13
	d. Registered Pesticides	14
	e. Toxicity – Water and Soil	15
	f. Legacy Pesticide and Metals	16
	g. Dissolved Oxygen and pH	17
	h. Salinity	18
3.	Appendix A	20
4.	Appendix B	21
5.	Appendix C	22
6.	Appendix D	23

Water Quality Management Plan – August 2012
Main Drain

1. Introduction

a. Purpose

Per the California Regional Water Quality Control Board Central Valley Region Monitoring and Reporting Program Order No. R5-2008-0005 for the Irrigated Lands and Regulatory Program, if more than one exceedance of the same water quality parameter at the same location occurs within a three-year period then a Management Plan is required by the Central Valley Regional Water Quality Control Board (Regional Board).

Buena Vista Water Storage District (District) owns and operates the Main Drain located in the Kern River watershed approximately 20 miles west of Bakersfield where one of several water quality sampling sites is located for the Kern River Sub-Basin portion of the Monitoring and Reporting Program administered by the Southern San Joaquin Valley Water Quality Coalition. This sampling location on the Main Drain at Highway 46, identified as SWQ_STA-1, has yielded a number of exceedances within a three year period and therefore requires a Management Plan. Additionally, per the preliminary draft of the 2012 Main Drain Management Plan, three different sampling sites on the Main Drain were added where corresponding water quality analysis indicated additional exceedances. Please see Appendix A for data summary.

b. Background

Approximately 50,000 acres of land within the District boundaries are enrolled in the Irrigated Lands Regulatory Program (ILRP) under the Southern San Joaquin Valley Water Quality Coalition (SSJVWQC). Of those lands within the District most farming operations include the use of row or flood irrigation methods and either directly or indirectly utilize the Main Drain for irrigation runoff. Cotton, alfalfa and grains continue to be the primary crops within the District but the District is seeing a growing trend of permanent crops such as pistachio and pomegranate trees which generate little or no irrigation runoff.

The Main Drain is over 20 miles long and runs almost the entire length of the Buttonwillow Service Area of the District. The Main Drain leaves the District boundary at Highway 46, Section 33, Township 26 South, Range 22 East, and ties into the Goose Lake Canal which can convey irrigation runoff to and beyond the Kern National Wildlife Refuge which is approximately eight miles downstream from Highway 46. Please see Appendix B for District map.

c. Watershed Description and Land Uses

The Main Drain is over 20 miles long and runs almost the entire length of the Buttonwillow Service Area (BSA) of the District. Elevation in the District ranges from 290 feet above sea level in the southern portion to about 232 feet above sea level in the north. The Main Drain essentially bisects through the middle of the BSA, draining the area from the south to the north by collecting runoff directly from agricultural fields or from a series of lateral drains throughout

Water Quality Management Plan – August 2012
Main Drain

the BSA. Additionally, the Main Drain passes through the small community of Buttonwillow where storm runoff from the community enters the drain.

The District receives irrigation water supplies from the Kern River and the State Water Project but groundwater is also used to meet crop demands. The District is an agricultural irrigation district and the entirety of the District's surface water supply is used for agricultural and environmental uses with no urban deliveries. As noted earlier, most farming operations within the District employ row or flood irrigation methods which typically generate irrigation runoff that regularly finds its way to the Main Drain. With cotton, alfalfa and grains continuing to be the primary crops within the District, typical irrigation cycles occur during the winter months of January and February (pre-irrigation) and the summer period of late May through August (irrigation season). Because of these typical irrigation cycles the agricultural runoff normally enters the Main Drain during the corresponding months but the Main Drain can also see significant flows during the other months of the year due to additional agricultural operations or storm runoff.

Please See Appendix C for a 2011 crop map and crop summary.

d. Summary of Water Quality Exceedances

There were a number of water quality exceedances that occurred from water samples taken from the Main Drain ranging from toxicity in water and soil (higher priority) to elevated levels of total dissolved solids (lower priority). Please see Appendix A for tables summarizing Main Drain water quality exceedances from August 2006 to January 2012.

2. Management Plan Approach for Specific Categories

a. Overview – Parameter Prioritization Rationales (RWQCB Item 1)

Implementation of Main Drain Management Plan parameters will be categorized into three priority tiers. An increase in parameter priority tier is contingent upon the frequency and magnitude of exceedances and the ability of agricultural management practices to favorably increase water quality. Higher tiered priorities will receive accelerated scheduling in comparison to lower tiered priorities because of a greater likelihood of adverse affects to beneficial uses and the higher probability that perceived agricultural sources are culpable. Registered pesticides and toxicity will receive the *highest priority* for Management Plan implementation. Secondly, legacy pesticides and trace metals will receive an *intermediate priority* for implementation. Thirdly, salinity, dissolved oxygen (DO), pathogens and pH will be assigned a *low priority* due to the probability that these parameters may have originated from non-agricultural sources and consequently will require greater time periods to identify and develop solutions.

The following Table illustrates the prioritization rationale of parameters to be addressed by the Management Plan:

Table 1: Management Plan Prioritization Rationales

MANAGEMENT PLAN PARAMETER CATEGORY	PRIORITY TIER	RATIONALE BEHIND PRIORITIZATION
Registered Pesticides	HIGH	High probability for adverse affect to aquatic life and of agricultural source origination. Possible improvements with successful ag management techniques.
Water and Sediment Toxicity	HIGH	High probability for adverse affect to aquatic life and of agricultural source origination. Possible improvements with successful ag management techniques when specific sources of toxicity are identified.
Legacy Organophosphate and Organochlorine Pesticides	INTERMEDIATE	Low potential to adversely affect aquatic life. High probabilities of past agricultural origins, but residential / commercial origins are possible.
Trace Metals	INTERMEDIATE	Intermediate potential for adversity to aquatic life and beneficial uses, however a strong possibility of natural occurrences. Consequently, multiple management programs may have to be implemented.
Salinity (Includes both TDS and Ec)	LOW	Low probability for adverse affect to aquatic life, but high adverse potential to irrigated agriculture. Increased salinity concentrations from irrigated lands and other sources. Multiple management strategies to cover designated sources.
Pathogens (Specifically E. coli) (RWQCB Item 8)	LOW	Low adverse potential to aquatic life, but high possibility to adversely affect other beneficial uses, such as human consumption. Attempts will be made to identify potential upgradient E. coli sources.
DO and pH	LOW	Intermediate potential to adversely affect aquatic life, low possibility to affect other beneficial uses.

Water Quality Management Plan – August 2012
Main Drain

As referenced above, a portion of the exceedances of contaminants being addressed by this Management Plan can reasonably be assumed to be caused by irrigated agricultural land use but also may be influenced by urban runoff from the Buttonwillow community and baseline levels in the irrigation water source. As a result, each of the stages of the Management Plan will address the following components as appropriate:

1. Strategy for identification of irrigated agricultural sources that may be the cause of the water quality problem:
 - Evaluation of water quality monitoring data
 - Evaluation of District chemical application records
 - Evaluation of District water delivery, flow rate, and drain operations
 - Review Department of Pesticide Regulation, Pesticide Use Report records
 - Perform study to determine region of potential contributing irrigation practices and agricultural operations
 - Evaluate potential non-agricultural sources
 - Routine field-level visual observations of Main Drain and potential influences
 - Special studies as necessary to isolate potential sources
2. Identification of potential management practices to be implemented that address the exceedances and identify the process for evaluation and tracking of current or recently implemented management practices (RWQCB Item2):
 - Determine existing management practices by conducting surveys using both direct communications with growers and the Grower Survey Form that follows:

GROWER SURVEY FORM (RWQCB Item 3)

Type of Crop(s) Grown: Row | Field | Orchard | Vineyard | Pasture | Other

NOTES: _____

Nutrient Management: Lab Analysis | Periodic/Timing | Book Values | Tissue Samples

NOTES: _____

Where Does Pesticides/Fertilizers/Loading Occur: Impervious Pad | Bare Soil | Off-site

NOTES: _____

Mixing/Loading Management Practices: Backflow Prevention | Air Gap | Operator Present At All Times

NOTES: _____

Rinseate/Empty Pesticide Containers: Triple Rinsed | Rinseate Reapplied to field | Recycled

NOTES: _____

Spray Equipment Management: Use of Correct Nozzles | Calibration | Outside Nozzle Shutoff

NOTES: _____

Irrigation: Optimize Efficiency | Tailwater Return | Scheduling/Instruments | Lab Analysis

NOTES: _____

Dormant Sprays: Check weather | Setbacks | Minimize Drift | Alternatives to Diazinon/Chlorpyrifos

NOTES: _____

Water Quality Management Plan – August 2012
Main Drain

- (RWQCB Item 2 and 3) The method for management practice tracking and evaluation of management practice effectiveness will consist of the following: An initial determination of existing management practices shall be well-documented by observations and reporting so that any Management Plan deficiencies can be rectified and/or new management practices implemented. This will ultimately lead to an evaluation of the effectiveness of the new management practices by **comparison** between initial and/or deficient plans with recently implemented plans.

(RWQCB Item 4) Perform follow-up communications with growers as necessary if management practice deficiencies were observed and/or communicated by the grower. Follow-up communications will collect additional data and information to **compare and contrast** in written form, the implementation and fulfillment of agricultural management practices that should increase beneficial use water quality and meet the corresponding goals of the Management Plan.

- (RWQCB Item 6) Collaborate with appropriate organizations, institutions and other coalitions (See Pg. 11 for a list of organizations) to determine appropriate additional general and commodity specific management practices and perform grower outreach to determine applicability, reasonableness, feasibility of additional management practices.

3. Management practice implementation schedule:

The general schedule for Management Plan implementation includes the schedules for implementation of the potential management practices and can be reviewed in Appendix D. Below is a schedule summary for management practice implementation for the different stages of the Management Plan:

Registered Pesticides & Toxicity	March 2014 & May 2014
Legacy Pesticides & Trace Metals	February 2015
Dissolved Oxygen & pH	February 2016
Salinity	May 2016

Many of the management practices can potentially be common to the different stages of the Management Plan and therefore already implemented prior to the stated schedule. Consideration of this information will be necessary in order to accurately assess management practices during the evaluation portions for later stages of the plan and in determination of added management practices.

4. (RWQCB Item 5) Management Practice Performance Goals for the Evaluation of the effectiveness of the Management Plan during Implementation:

Water Quality Management Plan – August 2012
Main Drain

The successful completion of the different stages of the Management Plan will ultimately be determined by the Executive Officer of the Regional Board. Generally there are four possible pathways for successful completion of a Management Plan stage:

- Agriculture is confirmed not to be a source of the exceedances, and the issue is referred to Regional Board Staff for other appropriate actions;
- Agriculture is confirmed as a potential source, the source is eliminated or controlled, and compliance with water quality objectives is demonstrated;
- Agriculture is a potential source, but compliance with water quality objectives is not achievable by reasonable and economically feasible agricultural management practices;
- No conclusion can be reached regarding the probable sources of exceedances, and reasonable efforts to identify the sources have been exhausted.

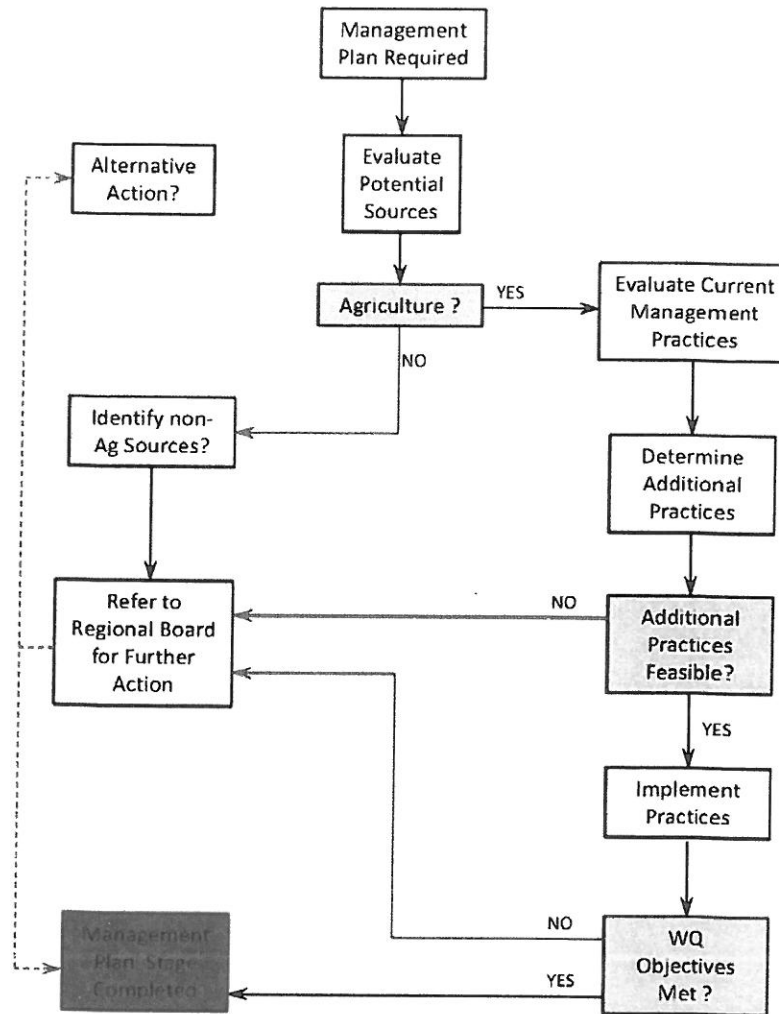
The criteria for completion of each of these pathways are illustrated in the following Figure 1 and the specific information and data used for the pathways will be documented for each element of the Management Plan. Progress of the Management Plan stages will be reported to and discussed with the Regional Board on a quarterly basis.

(RWQCB Item 5) Interim goals will also be implemented to keep track of the Management Plan progress. These goals will include outreach efforts with growers and related parties such as documenting the number of meetings between BVWSD and its members, number of workshops, US Mail/email communications, advisory assistance for management practice identification/ implementation and ultimately positive changes in water quality. All goals can be quantified with documented and reported progress toward them in the annual Management Plan Progress Reports. The evaluation of Management Plan effectiveness will be predicated on accomplishing the following performance goals:

- Completion of source identification and evaluation
- Documented outreach to Coalition members and return of Grower Surveys
- Documentation of initial (baseline) management practices from surveys
- Implementation of additional management practices by grower-members
- Quantified decrease in the number of exceedances or detections in test samples with the goals and schedule established in the Management Plan Progress Report

Water Quality Management Plan – August 2012 Main Drain

Figure 1 – Management Plan Completion Flow Chart



Management Practice Performance Goals and a Schedule for Performance Goal Implementation and Evaluation:

The general schedule for the Management Plan incorporates the schedules for the pathways to achieving goals as described above and can be reviewed in Appendix D. Below is a schedule summary of pathway completion for each stage of the Management Plan:

Registered Pesticides & Toxicity	2 nd & 3 rd Quarters 2014
Legacy Pesticides & Trace Metals	2 nd Quarter 2015
Dissolved Oxygen & pH	2 nd Quarter 2016
Salinity	3 rd Quarter 2016

Water Quality Management Plan – August 2012
Main Drain

5. Effective monitoring schedule.

The success of the Management Plan potentially relies on an effective water quality monitoring sampling program. Ultimately the concern for water quality issues center on the quality of the Main Drain water as it leaves the District boundary at Highway 46 and potentially enters other Waters of the State. This location is the last downstream sampling station on the Main Drain and will continue to be a standard sampling station throughout each of the different Management Plan stages.

Sampling at this site will be done on a monthly basis and water quality analysis will be performed for the exceedances of concern. If there is a no flow condition during a scheduled sample collection at this location then that month's sampling event will be omitted. For the year 2011 there were 10 monthly sampling events and for 2010 there were 9 monthly sampling events.

A second sampling site is located on the Main Drain at Seventh Standard Road. This sampling location was introduced in the 2009 draft of the Management Plan to help identify potential sources of water quality issues and has continued to be sampled on a monthly basis. Data provided by this sampling station may prove to be useful in determining potential sources of water quality issues and will continue to be sampled on a monthly basis unless there is a no flow condition at this location. If at some point throughout the Management Plan process it is determined this sampling location no longer provides value to the process then, with the Regional Board's approval, this sampling site will be temporarily suspended or eliminated.

Conversely, if it is determined that additional sampling sites may be necessary then the Regional Board will be consulted to determine the appropriate frequency and locations of the additional sampling events.

6. Process and schedule for evaluating management practice effectiveness.

The successful completion of the Management Plan will, in all likelihood, rely on implementation of reasonable and feasible management practices. It will be necessary to not only determine the appropriate management practices to implement but to also evaluate the effectiveness of those implemented practices. The process to help determine the appropriate management practices for each stage of the Management Plan will use the following guidelines:

- Determine existing management practices by conducting surveys using both direct communications with growers and survey forms
- Perform follow-up communications with growers as necessary to collect sufficient data
- (RWQCB Item 6) Collaborate with appropriate organizations, institutions and other coalitions to determine appropriate additional general and commodity

Water Quality Management Plan – August 2012
Main Drain

specific management practices. The following organizations are identified as capable of determining appropriate management practices:

University of California Cooperative Extension (UCCE)

County Agricultural Departments/Commissioners

Resource Conservation Districts (RCD)

Natural Resource Conservation Service (NRCS)

Coalition for Urban/Rural Environmental Stewardship (CURES)

Certified Crop Advisors/Pest Control Advisors (ASA/CAPCA)

- Perform grower outreach to determine applicability, reasonableness, and feasibility of additional management practices

Once the appropriate practices are implemented, a process to evaluate and document the effectiveness of the management practices will be necessary to determine if water quality objectives were met which completes the Management Plan stage or if further consultation with the Regional Board is necessary. The process to help determine the effectiveness of management practices for each stage of the Management Plan will use the following guidelines:

- Evaluate the number of Growers that are properly implementing appropriate management practices through direct communication and surveys
- Perform field-level visual surveys to assist in evaluation of properly implemented practices
- Continue water quality monitoring per monitoring schedule
- Analyze water quality data to determine trends or response to practices
- Report findings to Regional Board

The general schedule for Management Plan incorporates the schedules for evaluating management practice effectiveness as described above and can be reviewed in Appendix D. Below is a schedule summary for evaluating management practice effectiveness for each stage of the Management Plan:

Registered Pesticides & Toxicity	August 2014 & November 2014
Legacy Pesticides & Trace Metals	August 2015
Dissolved Oxygen & pH	August 2016
Salinity	November 2016

7. Identification of the participants and Coalition Group that will implement the Management Plan:

Currently, growers that have the potential to impact the Main Drain water quality with irrigation activities are entirely within the District boundaries and are members of the Southern San Joaquin Valley Water Quality Coalition (SSJVWQC).

Water Quality Management Plan – August 2012
Main Drain

The SSJVWQC was formed in 2002 for the purpose of jointly and cooperatively addressing water quality issues common to the water and resource agencies in the Tulare Lake Basin. Four major river systems are included in the Coalition: the Kings River, Kaweah River, Tule River and Kern River watersheds. Each sub-watershed has a lead coordinator that provides the SSJVWQC with supporting effort and documents associated with their respective sub-watershed regions to implement the Irrigated Lands Regulatory Program.

The Main Drain is located within the Kern River sub-watershed where previously the Kern County Water Agency represented the Kern River sub-watershed as the lead coordinator reporting to the SSJVWQC. As of January 1, 2012 the Kern River Watershed Coalition Authority was formed and now represents the Kern interests in matters regarding the SSJVWQC and the ILRP.

Given that all growers within the Main Drain watershed are located within the District and the District owns and operates the Main Drain, the District typically administers and coordinates ILRP efforts on behalf of its in-District landowners. Accordingly, the District coordinates with the Kern River sub-watershed group regarding activities surrounding the Main Drain and will continue to do so for the purposes of the Management Plan. Below is Table 2 summarizing the participating parties and their corresponding responsibilities for implementation of the plan.

Table 2 - Main Drain Management Plan Implementation

Management Plan Tasks	Responsible Party
Management Plan Schedule	District
Management Plan Development and Submittal	District
Management Plan Review and Acceptance	RB
Management Plan Implementation	District
Management Plan Updates and Meetings	District/RB
Provide Progress Updates/Reports to Subwatershed	District
Report on Plan Activities for Required MRP Reporting	KRWCA
MRP Reporting to Regional Board	SSJVWQC

District- Buena Vista Water Storage District
KRWCA - Kern River Watershed Coalition Authority
SSJVWQC - Southern San Joaquin Valley Water Quality Coalition
RB - Central Valley Regional Water Quality Board

Water Quality Management Plan – August 2012
Main Drain

8. Identified routine schedule of reporting to the Regional Water Board:

The District will meet with the Regional Board Staff on a quarterly basis to discuss Management Plan implementation, progress and any other applicable aspects of the plan to help ensure the successful implementation of the plan. Written reports and supporting documents will be provided on the same quarterly schedule. Please see Appendix D for the quarterly schedule.

b. Development and Implementation Schedule

The schedule for Main Drain Management Plan Development and Implementation was submitted to the Regional Board January 23, 2012.

Due to the multiple and various exceedances reported on the Main Drain the approach for this Management Plan is to first address occurrences or contaminants that are considered to be of a higher priority for surface waters such as registered pesticides and toxicity in the water and soil. Then after the process is well underway the next stage will begin and subsequent stages in the same manner for the lower priority issues. The following is the general order by which the Management Plan will address the exceedances:

Registered Pesticides & Toxicity in Water and Soil
Legacy Pesticides & Trace Metals
Salinity
Dissolved Oxygen & pH

Please see Appendix D for the Main Drain Management Plan Development and Implementation Schedule.

c. Documentation and Management Plan Reporting (RWQCB Item 7)

Management Plan reporting will supply timely and adequate information pertaining to achievement of performance goals. Documentation of source identification evaluations, evaluations of the effectiveness of management plan implementation, identification of deficiencies and required changes that may have to be implemented, will all be addressed. All these evaluations will be conducted and reported annually in concert with the Annual Monitoring Report. Data reports will continue to be submitted on a quarterly schedule.

Since the BVWSD is conducting ILRP operations under a Management Plan, the BVWSD will not be required to report Main Drain exceedances of the constituents covered by the Management Plan within the seven (7) day requirement per the Monitoring and Reporting Program (MRP), and exceedance reports will be submitted to the Regional Board in accordance with the Management Plan.

Water Quality Management Plan – August 2012
Main Drain

d. Registered Pesticides

Exceedances of registered pesticides are considered high priority and will be addressed in the first stage of the Management Plan. Registered pesticides are pesticides that are legally registered for agricultural use and pesticides that are banned for use will be addressed under the Legacy Pesticide and Metals Stage.

Currently the only registered pesticide that has been shown to exceed water quality limits multiple times at the same location within a three-year period is chlorpyrifos. There have been a number of known exceedances since January 2010 and are summarized in Table 2 below.

Table 3 - Main Drain Chlorpyrifos Exceedances

Date	Hwy 46 (ug/L)	7th Standard Rd. (ug/L)
1/26/2010	0.019	
3/24/2010	0.06	0.092
4/27/2010	0.12	0.077
5/19/2010	0.08	0.076
6/24/2010		0.023
7/27/2010	0.06	0.19
8/25/2010	0.34	0.35
9/29/2010	0.046	0.05
3/30/2011	0.053	
4/25/2011	0.072	0.13
5/31/2011		0.058
7/28/2011	0.32	0.29
8/31/2011	0.53	1.4
9/29/2011	0.16	0.51

WQ Limit = .015 ug/L

Chlorpyrifos is a organophosphate insecticide that is only registered for agricultural use in the U.S. and is used under many different trade names such as Bordan, Detmol UA, Dowco 179, Dursban, Empire, Eradex, Lorsban, Paqeant, Piridane, Scout, Stipend and Tricel. Chlorpyrifos is commonly used for cotton but also used for alfalfa and wheat crops which are the three top crops within the District.

Although this Management Plan will currently address chlorpyrifos as the only registered pesticide, if future exceedances of additional registered pesticides that would normally trigger a management plan occur during the implementation process of this current Management Plan then the Regional Board will be consulted to determine if the inclusion of the new contaminants into the existing process will be appropriate.

Water Quality Management Plan – August 2012
Main Drain

Successful completion of this stage of the Management plan will require following the appropriate pathways as described earlier in this Management Plan using thorough evaluations, analysis, and sufficient data.

e. Toxicity in Water and Soil

Exceedances of toxicity in water and soil are considered high priority and will be addressed in the first stage of the Management Plan. Three species that are used to determine toxicity in water and sediment samples, *Ceriodaphnia dubia*, *Selenastrum capricornutum* and *Hyalella azteca*, have indicated statistically significant mortality since 2005 and are summarized in Table 4 below.

Table 4 - Main Drain Significant Mortality

Date	Hwy 46 (ug/L)			7th Standard Rd. (ug/L)		
	CD (%)	SC (%)	HA (%)	CD (%)	SC (%)	HA (%)
8/31/2005		45	5			
4/10/2006		17				
7/12/2007			0			
8/27/2008		40	29			
2/18/2009		20				
7/28/2011	45			35		
8/31/2011	0			0		

CD - *Ceriodaphnia dubia*
SC - *Selenastrum capricornutum*
HA - *Hyalella azteca*

Ceriodaphnia dubia is a tiny copepod that is commonly referred to as a water flea and is widely used in water column toxicity and bioaccumulation tests. Acute toxicity testing was performed per guidelines prescribed under EPA method EPA-821-R-02-12.

Selenastrum capricornutum is a fresh water algae used to estimate the chronic toxicity of effluents and receiving waters. Chronic toxicity testing was performed per guidelines prescribed in EPA method EPA-821-R-02-013.

Water Quality Management Plan – August 2012
Main Drain

Hyalella azteca is a freshwater amphipod that is commonly used in laboratory sediment toxicity and bioaccumulation tests. Sediment toxicity testing was performed per guidelines of EPA method EPA/600/R-99/064.

Successful completion of this stage of the Management plan will require following the appropriate pathways as described earlier in this Management Plan using thorough evaluations, analysis, and sufficient data.

f. Legacy Pesticides and Metals

Exceedances of banned pesticides or legacy pesticides along with exceedances of trace metals are considered a lower priority than pesticides or toxicity and will be addressed in this stage of the Management Plan.

Historical uses are considered the most likely source for legacy pesticides and it could prove unfeasible to employ a process to identify potential sources. Additionally, these pesticides are no longer used and therefore there would be no appropriate management practice to implement aside from potential sediment discharge control which could also be potentially unfeasible.

Trace metals are known to be present in a variety of sources including surface water, groundwater, natural geological sources, urban runoff and also from agriculture. Understanding the local water irrigation sources, there is a strong potential the source of the trace metal exceedances will be attributed to importation via water supplies.

A legacy pesticide has been detected and a number of trace metal exceedances were detected beginning in August of 2008 and are summarized in Table 5 below.

Water Quality Management Plan – August 2012
Main Drain

Table 5 - Legacy Pesticide and Metal Exceedances

Date	Hwy 46 (ug/L)			7th Standard Rd. (ug/L)		
	DDE	Arsenic	Mo	DDE	Arsenic	Mo
8/27/2008						
2/18/2009						
5/27/2009						
6/29/2009	0.0035					
8/27/2009	0.007					
9/29/2009	0.008					
1/26/2010						
2/21/2010						
3/24/2010						
4/27/2010						
9/29/2010						
3/30/2011		25.4	41.3			
4/25/2011		11.3			11	
5/31/2011					11.6	
6/29/2011					18.1	
7/28/2011		13.4			11.6	
8/31/2011		13.3			11.9	
9/29/2011					13.5	23.8
12/28/2011		11.9	11.7			
1/25/2012		16.1	16.7		14.7	10.5

Boron exceedances will be addressed within the Salinity stage of this Management Plan.

Successful completion of this stage of the Management plan will require following the appropriate pathways as described earlier in this Management Plan using thorough evaluations, analysis, and sufficient data.

g. Dissolved Oxygen and pH

This stage of the Management Plan will address the exceedances of dissolved oxygen (DO) and pH and is considered a lower priority stage. Dissolved oxygen analysis measures the amount of gaseous oxygen dissolved in water. Oxygen gets into water by diffusion from the surrounding air, by aeration, as a waste product of photosynthesis and other means. There are many factors that can affect the levels of DO including temperature, conditions for photosynthesis, flow rate, organisms, TDS and agricultural related operations. The pH of water can also be affected by TDS or other minerals and metals along with agricultural runoff.

Water Quality Management Plan – August 2012
Main Drain

This is considered a lower priority due to the efforts of the preceding stages that will likely improve the DO and pH levels or it potentially could be determined that source water is a major contributing factor with few or no directly effective management practices. Below is Table 6 summarizing the DO and pH exceedances.

Table 6 - Dissolved Oxygen and pH Exceedances

Date	Hwy 46		7th Standard Rd. (ug/L)		Buttonwillow Dr.	
	DO (mg/L)	pH	DO (mg/L)	pH	DO (mg/L)	pH
7/27/2008		8.66				
8/27/2008		9.19				
8/27/2009		8.97				
2/21/2010		8.63				
3/24/2010		8.32				
4/27/2010		8.85				
5/19/2010			2.8		3.69	
6/24/2010					4.72	
7/14/2010		8.36				
8/25/2010			4.9			
1/27/2011		8.79				
1/25/2012	3.03					

Successful completion of this stage of the Management plan will require following the appropriate pathways as described earlier in this Management Plan using thorough evaluations, analysis, and sufficient data.

h. Salinity

This stage of the Management Plan will address the exceedances of total dissolved solids (TDS), electrical conductivity (EC), and boron. Salinity is an issue that affects many regions of the San Joaquin Valley including areas within Kern County and the District.

Although this Management Plan applies to the surface waters of the Irrigated Lands Regulatory Program, many, if not all, of the salt management practices will be developed or evolve from the groundwater aspects of the Long-Term Irrigated Lands Program and region specific General Orders. The Regional Board has begun efforts to address salinity problems in the Central Valley and to develop solutions to improve the salinity issues.

Water Quality Management Plan – August 2012
Main Drain

This stage of the management plan is deferred to the later stages due to the potential overlap with the currently developing groundwater General Orders and possible developing salt management practices. New information, practices, and requirements can greatly impact the factors used to determine the pathways as described earlier in this Management Plan.

Pending the outcome of the groundwater General Order, this stage of the Management Plan can either be required to follow the appropriate pathways as described earlier in this Management Plan using thorough evaluations, analysis, and sufficient data or the requirement of this stage can be relieved by management practices set forth in the General Order.

Appendix A

Exceedance Summary Tables

2012 Main Drain Water Quality Exceedances

	Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Dissolved Oxygen mg/L	Conductivity umhos/cm	Fecal Coliform MPN/100ml
						10	700	10	700	450	>5	700	400 (235)
1	MDC Hwy 46	1/25/2012	VI 1240155-001	FGL	9	16.1	1080	16.7	2070	1290	3.03	2075	130
2	MDC 7th Standard	1/25/2012	VI 1240155-003	FGL		14.7	576	10.5	1350	895	8.52	1348	3000

WQ Limit

Source: Buena Vista Water Storage District

Table: 2011 Summary

2011 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Ammonia Nitrogen mg/L	pH	Temp C	Conductivity umhos/cm	Chlorpyrifos ug/L	Dimethoate ug/L	Carbendazim % Survival	Fecal Coliform MPN/100ml	WQ Limits
1 MDC Hwy 46	1/27/2011	VI 1140171-001	FGL	0				377	218	ND	8.79	11.4	371				30	
2 MDC Hwy 46	2/24/2011	VI 1140422-001	FGL	18				584	366	0.402	7.95	13.2	579				1300	
3 MDC Hwy 46	3/30/2011	VI 1140701-001	FGL	0	25.4	702	41.3	1500	929	0.298	7.93	17.1	1486	0.053			30	
4 MDC Hwy 46	4/7/2011	VI 1140858-001	FGL	25	11.3	148	6.13	259	140	0.407	8.1	20.8	238	0.072	ND	100	220	
5 MDC Hwy 46	5/31/2011	VI 1141154-001	FGL	44	4.15	112	2.25	332	198	0.065	8.13	17.6	337	ND	ND	100		
6 MDC Hwy 46	6/29/2011	VI 1141396-001	FGL	24	7.88	115	5.62	271	169	0.099	7.61	22.6	269	ND	ND	100		
7 MDC Hwy 46	7/28/2011	VI 1141676-001	FGL	11	13.4	166	6.32	406	258	0.283	7.39	25.8	432	0.32	1.3	45	500	
8 MDC Hwy 46	8/31/2011	VI 1142103-001	FGL	47	13.3	213	6.4	527	325	0.03	7.73	26.7	545	0.53	ND	0	900	
9 MDC Hwy 46	9/29/2011	VI 1142374-001	FGL	30	7.45	226	4.68	587	362	ND	7.44	24.1	597	0.16	ND	100	80	
10 MDC Hwy 46	12/28/2011	VI 1143237-003	FGL	14	11.9	371	11.7	946	552	0.062	8.15	6.2	1080	ND	ND	100	170	
11 MDC 7th Standard	1/27/2011	VI 1140171-003	FGL					1990	1260	0.066	7.94	12.1	1982				140	
12 MDC 7th Standard	2/24/2011	VI 1140422-003	FGL					431	266	0.547	8.02	11.5	431				17000	
13 MDC 7th Standard	3/30/2011	VI 1140422-003	FGL															
14 MDC 7th Standard	4/25/2011	VI 1140858-003	FGL		11	121	5.41	223	134	0.575	7.72	22.4	221	0.13	ND	100	3000	
15 MDC 7th Standard	5/31/2011	VI 1141154-003	FGL		11.6	123	8.21	243	157	0.163	7.55	20.5	244	0.058	ND	100	5000	
16 MDC 7th Standard	6/29/2011	VI 1141396-003	FGL		18.1	114	7.51	188	167	0.07	7.39	22.7	190.3	ND	ND	95	8000	
17 MDC 7th Standard	7/28/2011	VI 1141676-003	FGL		11.6	134	4.64	398	247	1.9	7.56	28.5	396	0.29	ND	35	2200	
18 MDC 7th Standard	8/31/2011	VI 1142103-003	FGL		11.9	184	5.02	502	308	ND	7.68	26.5	499	1.4	ND	0	500	
19 MDC 7th Standard	9/29/2011	VI 1142374-003	FGL		13.5	1130	23.8	2170	1370	ND	8.21	26.2	2041	0.51	ND	100	500	
20 MDC 7th Standard	12/28/2011	VI 1143237-001	FGL		5.47	92.7	2.87	391	217	ND	8.02	6.3	362	ND	ND	100	50	

Source: Buena Vista Water Storage District

Main Drain @ Highway 46 - (558MDCH46)
(35.61e1, -119.61e3)
Kern Sub-watershed, Kern County

SUMMARY OF EXCEEDANCES LEADING TO MANAGEMENT PLAN(S)

DRAFT

Source: Regional Board

Management Plan Required	Units	Water Quality Limit	Source	Protected Use	Date and Concentration of Exceedance																						
					2006 - 2009																						
Flow (for reference)	cfs	N/A	Reference	N/A	12	8/30/2006	1/31/2007	8/15/2007	7/27/2008	8/27/2008	2/18/2009	5/27/2009	6/29/2009	8/27/2009	9/29/2009	1/26/2010	2/21/2010	3/24/2010	4/27/2010	5/19/2010	7/14/2010	8/25/2010	9/29/2010				
pH	pH Units	6.5-8.3	TLBP	ANY				69	7	8	NR			20	4	4		8.63	8.32	8.85							
DDE		0.001	NAWQC	FALP				8.66	8.18					8.97	0.008						8.36						
Toxaphene	µg/L	0.0002	NAWQC	FALP									0.0035	0.007													
Boron	µg/L	700.0	WQA	FALP								0.037	0.036														
Total Dissolved Solids	mg/L	450.0	WQA	AGR	640	590	550	480	1120	1260	900	996	610	1190	1410	1002	1260	1210	2580	1200				1150			
Chlorophylls	µg/L	0.0150	SSJRB	FALP													0.019		0.06	0.12	0.08	0.34	0.05				
EC	µS/cm	700	WQA	AGR																							
E. Coli	MPN/100 mL	235	QCW86	REC-1															1557				2340				

Source: Regional Board

Existing Management Plans		Statistically Significant Toxicity						
Flow (for reference)		8/31/2005	4/10/2006	6/28/2006	8/30/2006	7/12/2007	8/27/2008	2/18/2009
	cfs	9		32	12	22	8	
Selenasium capricornum	% Growth Reduction	45	17				40	20
Hyalella azteca	% Survival	5		80	60	0	29	

8/29/2009 DDE result flagged, value above MDL (0.001 µg/L) but below PQL (0.005 µg/L)
5/27/2009 and 8/29/2009 Toxaphene results flagged, value above MDL (0.01 µg/L) but below POL (0.05 µg/L)
8/31/2005 Hyalella test control failure. 87.5% survival of control population

SSJRB - Sacramento and San Joaquin River Basin Plan
TLBP - Tulare Lake Basin Plan
FALP - Freshwater Aquatic Life Protection
WQA - Water Quality for Agriculture (Ayers & Westcott)
AGR - Agricultural Supply
NAWQC - National Ambient Water Quality Criteria
QCW86 - USEPA Quality Criteria for Water, 1986
REC-1 = Water Contact Recreation

Main Drain at 7th Standard - (558MDC7SR)

(35.4416, 119.5498)

Kern Sub-watershed, Kern County

SUMMARY OF EXCEEDANCES LEADING TO MANAGEMENT PLAN(S)

DRAFT

Source: Regional Board

Management Plan Required	Units	Water Quality Limit	Source	Protected Use	Date and Concentration of Exceedance						
					2006 - 2010						
Flow (for reference)	cfs	N/A	Reference	N/A	3/24/2010	4/27/2010	5/19/2010	6/24/2010	7/27/2010	8/25/2010	9/29/2010
EC	µmhos/cm	700	WQA	AGR	1425	1587					1436
DO	mg/L	5	TLBP	FALP			2.8			4.9	
E. Coli	MPN/100 mL	235	QCW86	REC-1						260	365
Chlorophyll	µg/L	0.015	SSJRBP	FALP	0.092	0.077	0.076	0.023	0.190	0.350	0.050

AGR - Agricultural Supply

TLBP - Tulare Lake Basin Plan

SSJRBP - Sacramento/San Joaquin River Basin Plan

FALP - Freshwater Aquatic Life Protection

WQA - Water Quality for Agriculture (Ayers & Westcott)

QCW86 - USEPA Quality Criteria for Water, 1986

Main Drain at Buttonwillow - (558MDCBWD)

(35.4038, -119.4740)

Kern Sub-watershed, Kern County

SUMMARY OF EXCEEDANCES LEADING TO MANAGEMENT PLAN(S)

DRAFT

Source: Regional Board

					Date and Concentration of Exceedance	
					2006 - 2010	
Management Plan Required					Source	Protected Beneficial Use
Flow (for reference)	Units	Water Quality Limit	Reference			
Dissolved Oxygen	cfs	N/A	TLBP			
	mg/L	5			5/19/2010	6/24/2010
					Low	Low
					3.69	4.72

TLBP - Tulare Lake Basin Plan

FALP - Freshwater Aquatic Life Protection

Main Drain at Front Street - (558MDCFS1)

(35.3996, -119.4645)

Kern Sub-watershed, Kern County

SUMMARY OF EXCEEDANCES LEADING TO MANAGEMENT PLAN(S)

DRAFT

Source: Regional Board

Management Plan Required	Units	Water Quality Limit	Source	Protected Beneficial Use	Date and Concentration of Exceedance	
					2006 - 2010	
Flow (for reference)	cfs	N/A	Reference	N/A	4/27/2010	Unknown
E. Coli*	MPN/100 mL	235	QCW86	REC-1	5/19/2010	500

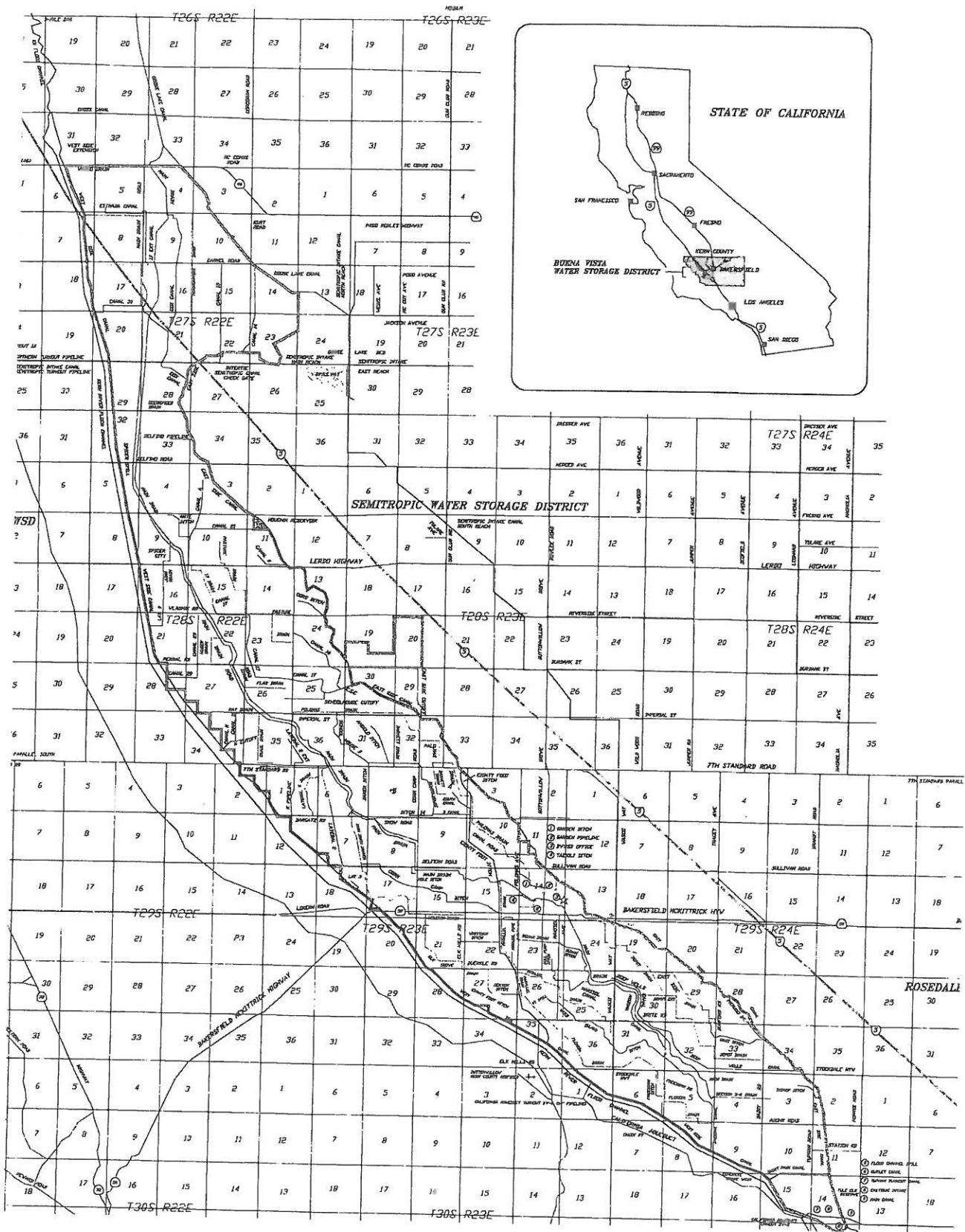
QCW86 - USEPA Quality Criteria for Water, 1986

REC-1 = Water Contact Recreation

*E. Coli taken from Coalition summary, unable to find lab sheets

Appendix B

District Map



Water Quality Management Plan – August 2012
Main Drain

Appendix C

District 2010 Crop Map



Buena Vista Water Storage District

525 North Main P.O. Box 756
 Buttonwillow, CA 93206
 661-324-1101

0 1 2 4 Miles



Buttonwillow Service Area

2010 Crop Survey

Conservation Easement (5,212 Acres)

- Alfalfa (11,153.0 Acres)
- Cherry (40.5 Acres)
- Corn (588.4 Acres)
- Cotton (13,652.4 Acres)
- Grapes (34.6 Acres)
- Milo (764.8 Acres)
- Mix - Pistachio/Pomegranate (0.3 Acres)
- Mix - Pistachio/Wheat (85.4 Acres)
- Oats (2,231.3 Acres)
- Olive (80.6 Acres)
- Onion (800.2 Acres)
- Open (2,445.8 Acres)
- Pistachio, M (722.8 Acres)
- Pistachio, Y (3,127.8 Acres)
- Pomegranate, M (1.8 Acres)
- Pomegranate, Y (1,473.2 Acres)
- Sudan (1,305.4 Acres)
- Tiffany (45.0 Acres)
- Tomato (320.6 Acres)
- Wheat (3,610.5 Acres)



Maples Service Area

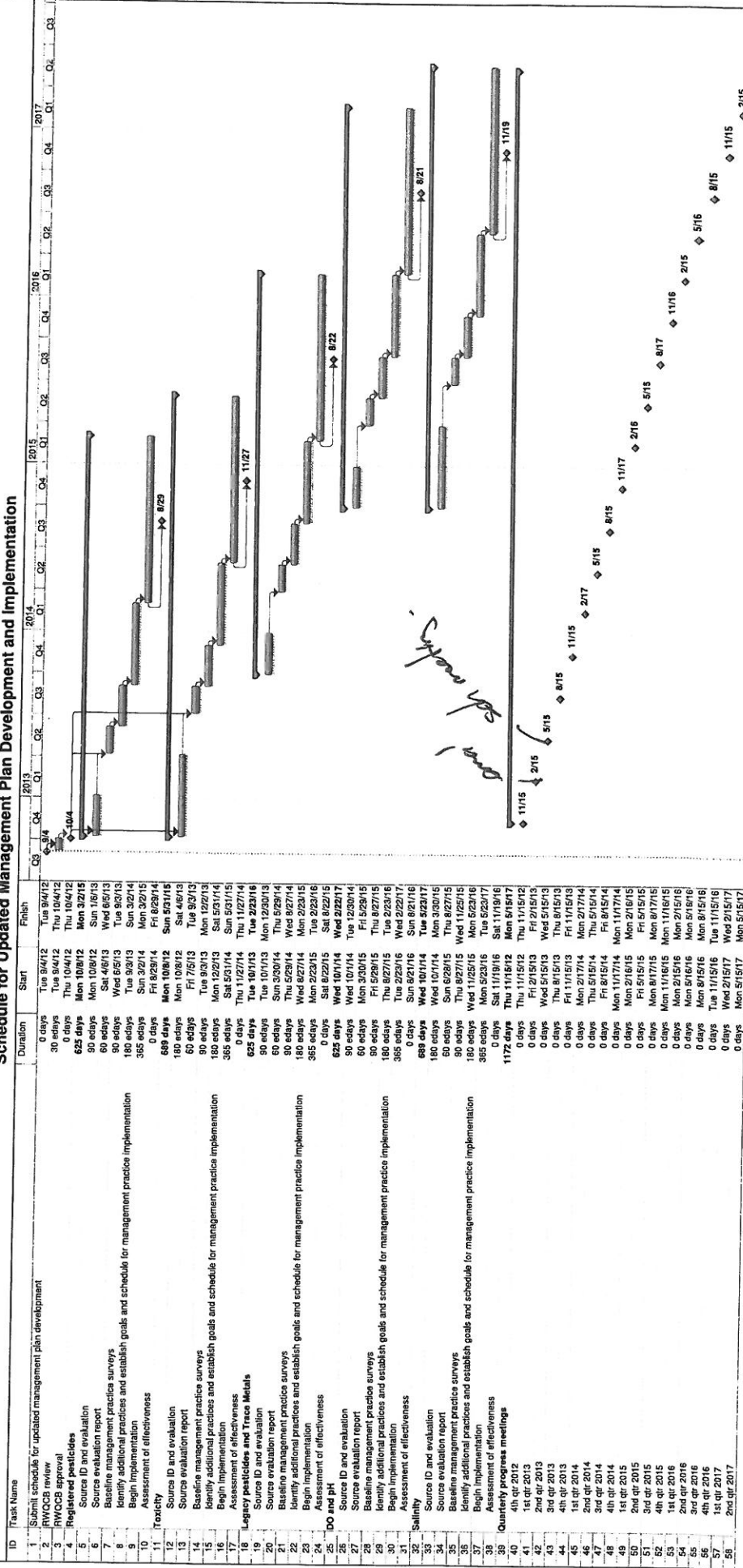
Appendix D

Schedule for Updated Management Plan Development and Implementation

Buena Vista Water Storage District

Main Drain

Schedule for Updated Management Plan Development and Implementation



APPENDIX D

Water Quality Management Plan – August 2012 Main Drain Buena Vista Water Storage District – Buena Vista Coalition

INTRODUCTION

The Buena Vista Water Storage District (BVWSD) was originally enrolled in the California Regional Water Quality Control Board Central Valley Region Monitoring and Reporting Program Order R5-2008-005 for the Irrigated Lands Regulatory Program. BVWSD operates the Main Drain Canal, located within the Kern River Watershed approximately 20 miles west of Bakersfield where one of several water quality sampling sites is located for the Kern River –Sub-basin portion of the Monitoring and Reporting Program administered by the Southern San Joaquin Valley Water Quality Coalition (SSJVWQC.) This site, located in the Main Drain Canal at Highway 46, identified as SWQ STA-1 yielded a number of exceedances within a three year period and therefore required a Management Plan. A management plan was adopted, “*Water Quality Management Plan – August 2012 Main Drain*” (2012 Management Plan.)

In June of 2013 the Buena Vista Coalition (BVC) received its NOA to be a Coalition under Order R5-2011-0032, Conditional Waiver for Discharges from Irrigated Lands. Subsequently the BVC received its NOA for the General Order R5-2013-0120 in February of 2014. During all of this time the BVWSD has continued to monitor the Main Drain Canal and submit quarterly reports as required per the 2012 Management Plan.

WATERSHED DESCRIPTION AND USES

The BVWSD serves approximately 45,000 acres of gravity fed, irrigated farm land in two sloughs which were part of the historic Kern River system. These two areas are identified as the Maples Service Area and the Buttonwillow Service Area (BSA.) The Main Drain Canal is in the BSA and flows primarily north for over 20 miles within the BVWSD, and continues north to the historic Tulare Lake Bed. In addition to river flows the Main Drain Canal serves as the storm drain system for the BSA, as storm water flows east or west into the Main Drain Canal during a larger storm event, and flows north towards Tulare Lake. Since the building of Isabella Dam, and with the continued development of irrigated agriculture in the Kern County Valley floor, natural river flows rarely reach the Main Drain Canal, and these larger storm events occur less than annually. The BSA is approximately 40,000 acres of irrigated farmland, 2,800 acres of conservation easements, and the community of Buttonwillow. Currently the community of Buttonwillow drains into the Main Drain Canal during storm events.

In addition to its historical drainage use, the Main Drain Canal has operated as a District-wide tailwater drain for the irrigated fields in the BSA. Historically the BSA has grown cotton, alfalfa, and grains using furrow and border strips irrigation. Run-off water from the fields flowed to the Main Drain Canal where it flowed north out of the BVWSD. Since 2006 the BVWSD has seen a transformation of land uses from row crops to permanent crops consisting of pistachio trees, pomegranate trees, and dried on-the-vine raisins. The BVWSD currently has over 10,000 acres of permanent crops, with plans for over 5,000 additional acres of conversion in the next couple of years. Continued conversion to permanent crops is likely as the BVWSD has sufficient water rights (Kern River and State Water Project, SWP) and good groundwater to support a high percentage of permanent crops.

SUMMARY OF EXCEEDANCES

There were a number of water quality exceedances that occurred from water samples taken from the Main Drain Canal ranging from toxicity in water and soil (higher priority) to elevated levels of total dissolved solids (lower priority.) Please see Appendix A for tables summarizing Main Drain Water Quality exceedances from April 2006 to May 2014.

SAMPLING LOCATIONS

In the SSJVWQC monitoring plan the Main Drain Canal was sampled at Highway 46. Once exceedances were noted three additional locations were added in the Draft Water Quality Management Plan. In the final 2012 Management Plan only two sample locations remained, the original site at Highway 46 and a second site at Seventh Standard Road. These two sites continue to be used.

Samples are taken monthly from each site, typically in the last week of the month. If no water is flowing no sample is taken that month.

PURPOSE OF SAMPLING

The State and Regional Waterboards are tasked with protecting the waters of the State of California. To do this they regulate discharges to both surface water and to groundwater. They regulate discharges from storm events and agriculture, both of which bring the Main Drain Canal into their purview. The Seventh Standard Road location was added in the 2009 Draft Management Plan to help identify potential sources of water quality issues.

2012 MANAGEMENT PLAN STAGES

To allow for the BVWSD to prioritize its management efforts the 2012 Management Plan separated tasks into five stages where exceedances had occurred:

1. Registered pesticides
2. Toxicity
3. Legacy Pesticides and Trace Metals
4. DO and PH
5. Salinity

The listing also established the priority of issues with the Registered Pesticides having the highest priority down through the lowest priority of salinity. It was understood that some of the exceedances possibly were caused from the Community of Buttonwillow's drainage. It was also noted that existing groundwater could cause exceedances.

Although the successful completion of any stage will be determined by the Executive Officer of the Regional Board, the 2012 Management Plan suggested four possible pathways for "successful completion" of a stage. These pathways are:

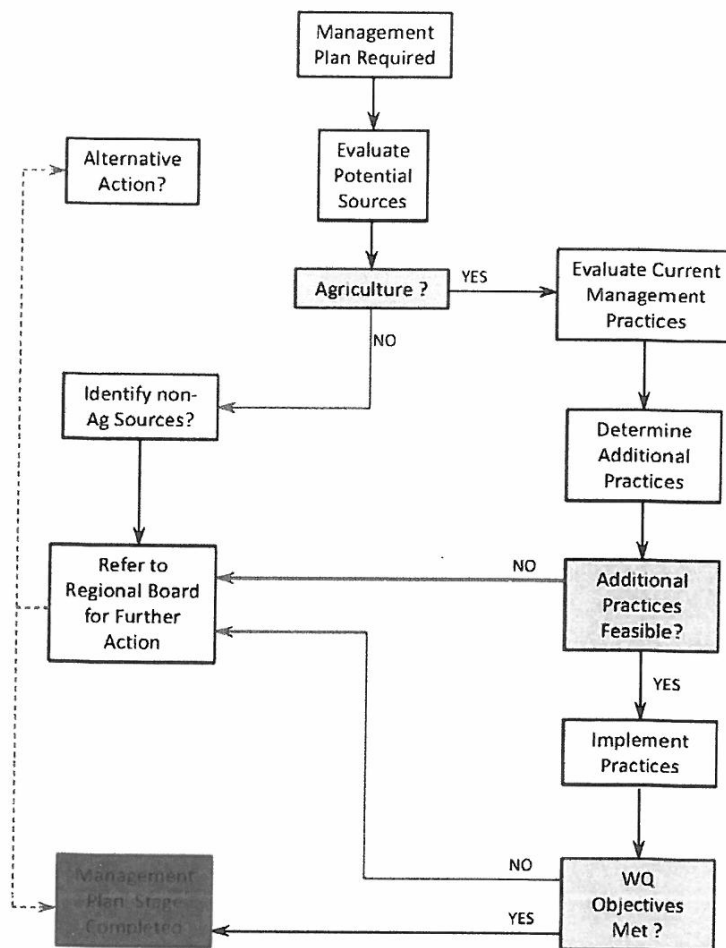
1. Agriculture is confirmed to not be a source of the exceedances, and the issue is referred to the Regional Board staff for other appropriate actions;
2. Agriculture is confirmed as a potential source, the source is eliminated or controlled, and compliance with water quality objectives is demonstrated;

3. Agriculture is a potential source, but compliance with water quality objectives is not achievable by reasonable and economically feasible agricultural management practices;
4. No conclusion can be reached regarding the probable sources of exceedances, and reasonable efforts to identify the sources have been exhausted.

The criteria for completion of each of these pathways can be seen in Figure 1, taken from the 2012 Management Plan. Items 1,3, and 4 all are referred to the Regional Board Staff for review and action. These paths can lead to the stage being considered successful, or to a new/alternative stage. Step two can lead to a successful completion, not requiring review by Regional Board Staff.

Water Quality Management Plan – August 2012 Main Drain

Figure 1 – Management Plan Completion Flow Chart



CHANGE OF SAMPLING LOCATION

The 2012 Management Plan allowed for the change of the Seventh Standard Road sampling location stating:

“If at some point throughout the Management Plan process it is determined this sampling location no longer provides value to the process then, with the Regional Board’s approval, this sampling site will be temporarily suspended or eliminated.”

COMPLIANCE WITH WATER QUALITY OBJECTIVES

To be successful in completing a stage using Path 2 from above under MANAGEMENT PLAN STAGES the BVWSD must eliminate the discharge of an exceedance to a Water of the State. The 2012 Management Plan states:

“Ultimately the concern for water quality issues center on the quality of the Main Drain water as it leaves the District boundary at Highway 46 and potentially enters other Waters of the State.”

To be successful BVWSD must either,

1. Eliminate the exceedance, or
2. Eliminate the discharge of water to other Waters of the State.

MANAGEMENT PLAN IMPLEMENTATION

BVWSD has a two prong attack on eliminating exceedances from leaving the District at Highway 46 in the Main Drain Canal. The BVWSD has attempted to eliminate the exceedances, as well as eliminate the flow.

Eliminating the exceedances is extremely difficult. The use of the Main Drain Canal as a tailwater system means irrigation run-off water enters the Main Drain Canal. It is understood that irrigation run-off water is likely to contain pesticides. So while the BVWSD staff has educated growers about the need to properly apply all pesticides, especially on fields adjacent to canals and drains, it cannot eliminate them from run-off water.

Local groundwater has trace metals and high total dissolved solids. When growers need to use deep wells for irrigation the tailwater will create exceedances even if no pesticides are being used or present. Although these items might be considered a success in Path 3, it would only be referred to Regional Board Staff. To be successful under Path 2, since the exceedance cannot be eliminated through best management practices, BVWSD staff has worked to eliminate the Discharge to other Waters of the State.

In review of Appendix A, which lists the exceedances, one can see the BVWSD has been successful in not allowing the tailwater in the Main Drain Canal to leave the District boundary, and have the potential to mix with other Waters of the State. No water has left the District in the Main Drain Canal since July 2013. (note this was SWP water purchased by the Kern Wildlife Refuge and being wheeled through the BVWSD which will be described below.) No sample taken reflects no water flowing in the Main Drain Canal.

STEPS TAKEN BY GROWERS

The growers have been changing from furrow and border strip irrigation to drip and micro sprinkler irrigation. All permanent crops in the BVWSD are irrigated using high efficiency irrigation systems. These produce no run-off of tailwater into the Main Drain canal. This has reduced flow in the Main Drain Canal substantially, over 20% of the irrigated acres of the BSA are now using high efficiency irrigation systems. There are over 8,000 acres of land BSA land fallowed in 2014. While some of these lands are in response to the drought, a portion of these lands are fallow as they transition to permanent crops, which will continue the reduction of drain water.

Approximately 3,900 acres of farm land in the BSA have been permanently taken out of production. 2,800 of these acres are covered with conservation easements. These lands do not create any drain water, but can receive any surplus drain flow into their wetlands and uplands. BVWSD bought an easement on the other 1,100 acres to develop an in district Groundwater Recharge and Recovery Program.

Growers have also added turnouts, increased pump capacity, and in general planned to use drain water more frequently. The growers now are “in-line” waiting for drain water to be available.

REGULATORY STEPS TAKEN TO REDUCE MAIN DRAIN CANL FLOW

A. SBx7-7

This Senate Bill required Agricultural Water Suppliers “To begin to measure water to customers, adopt a pricing structure that has a volumetric component...” Prior to 2013 the BVWSD did not sell water to its growers. Based on the availability of the water, the BVWSD would make allocations on a “per acre” basis for set time periods. There was no cost to the grower for the water, whether the allocation was 2 acre-feet or ½ an acre-foot. Beginning with the 2013 summer delivery the BVWSD set a price of \$17.50/acre-foot. Even this nominal price caused the growers to re-evaluate their irrigation practices.

B. Main Drain Regulatory Plan

Based on the requirements of the 2012 Management Plan, BVWSD realized how much money it was spending on the testing due to the Main Drain Canal discharges. Testing costs in 2012 were \$150,000 and \$120,000 in 2013. The only way to reduce these costs was to not let water flow out of the District at Highway 46. The BVWSD started a quarterly newsletter which provides an opportunity to educate the growers on these issues. The high cost of monitoring was an inducement to solve the problem. The drought and growers response to outreach programs have allowed BVWSD to reduce its monitoring costs to approximately \$30,000 through May 2014. The BVWSD is optimistic it will be able to achieve the savings over 2012 and 2013 in a normal year. This savings is a direct reflection on reduced flow leaving the BVWSD.

C. Irrigated Lands Regulatory Program

Many growers in the BVWSD were never aware of the cost of the monitoring program in the Main Drain Canal. When a review of the budget for the BVC for the new General Order was presented, the growers saw that Main Drain testing was costing \$3.00/acre. This meant fees for the BVC were higher than adjacent Coalitions. The budgeting process and outreach efforts helped point out the savings affected by reducing the Main Drain Canal flow.

While none of these regulatory matters directly caused reduction in flows in the Main Drain Canal, as a group they have had a major influence on grower behavior.

WHEELED WATER THROUGH THE MAIN DRAIN CANAL

The Kern Wildlife Refuge (Refuge) is located 7 miles north of BVWSD and Highway 46 adjacent to the Main Drain Canal. It is supplied water delivered through the State Aqueduct to BVWSD, who then wheels it to the Refuge through the Main Drain Canal. Historically this water would enter into the BVWSD four miles south of Highway 46, and be blended with BVWSD water as it flowed north to the Refuge. In July and August 2013 this SWP water was primarily the water being tested in the Main Drain at Highway 46, see Appendix A. The TDS of the water tested in the Main Drain Canal at Highway 46 in July and August 2013 is reflective of SWP quality water.

Below are pictures taken by the testing laboratory at the G&G crossing, one mile south of Highway 46, where the sample is actually gathered. The 7-23-2013 picture is looking south towards the sample location and the 8-28-2013 picture is from the sample location looking north. The temporary pumps on the west bank were for an oilfield operation.

Main Drain Canal looking south towards Highway 46 sampling location



Main Drain Canal Highway 46 Sampling Location looking north



Both of these pictures show the high flow associated with flows to the Refuge, and not the nominal flows which have become routine in the north end of the Main Drain Canal.

In the spring 2014 the BVWSD built a new turnout 1-1/2 miles south of Highway 46, and a ½ mile south of the two pictures above, to supply water to the Main Drain Canal for the Refuge. It is anticipated that the Main Drain Canal will be dry south of I-5., see Figure 2. This new turnout is called the Semitropic Turnout. The BVWSD expects the Main Drain Canal to continue to be dry from the weir just north of the “Last Downstream Location of Drain Water Entering Main Drain” to the Semitropic Turnout location, as also shown on Figure 2.

It seems logical to assume that the intent of the 2012 Management Plan is to test run-off from farms in the Main Drain Canal not SWP water. However, if the Main Drain Canal water blends with this water in the Main Drain Canal and is exiting the BVWSD it needs to be tested, because Main Drain Canal waters would be reaching other Waters of the State.

CONCLUSION – REQUESTS TEMPORARY SUSPENSION UNDER THE FOLLOWING CRITERIA

It ultimately is the goal of the 2012 Management Plan to not let water of the Main Drain Canal add to other Waters of the State. The BVWSD has been successful in its efforts into eliminating the flow leaving the BVWSD. It seems reasonable to suspend the testing at Seventh Standard Road, as this site would be used only for finding contributors to exceedances, and does not contribute to BVWSD's efforts to keep Main Drain Canal waters from joining other Waters of the State. BVWSD understands that should conditions change and warrant the reinstatement of the Seventh Standard Road testing site this change could be reversed. But as of now the Seventh Standard Road site does not add value to the process, and with the Regional Board's approval, it should be eliminated.

The site at 46 would continue to be monitored as per the 2012 Management Plan. If Main Drain Canal water is leaving the BVWSD the water needs to be tested. If the only water leaving the BVWSD in the Main Drain Canal is SWP water being wheeled to the Refuge, this water will not be tested.

APPENDIX A
EXCEEDANCES
April 2006-May 2014

2006 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Ammonia Nitrogen mg/L	pH	Temp C	Conductivity umhos/cm	Chlorpyrifos ug/L	Dimethoate ug/L	Ceriodaphnia Bioassy % Survival	Fecal Coliform MPN/100ml	Selenastrum capricimutum % Growth	Hyaella azteca % Survival
					10	700	10	700	450	1.5	6.5-8.3		700	0.015	1	<50%	400		
MDC Hwy 46	4/10/2006																	17	
MDC Hwy 46	6/28/2006																		80
MDC Hwy 46	8/30/2006			12					640										60

2007 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Ammonia Nitrogen mg/L	pH	Temp C	Conductivity umhos/cm	Chlorpyrifos ug/L	Dimethoate ug/L	Ceriodaphnia Bioassy % Survival	Fecal Coliform MPN/100ml	Hyaella azteca % Gr Red
					10	700	10	700	450	1.5	6.5-8.3		700	0.015	1	<50%	400	
MDC Hwy 46	1/31/2007								590									
MDC Hwy 46	7/12/2007																	0
MDC Hwy 46	8/15/2007			69					550									

2008 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Ammonia Nitrogen mg/L	pH	Temp C	Conductivity umhos/cm	Chlorpyrifos ug/L	Dimethoate ug/L	Ceriodaphnia Bioassy % Survival	Fecal Coliform MPN/100ml	Hyaella azteca % Survival	Selenastrum capricimutum % Growth
					10	700	10	700	450	1.5	6.5-8.3		700	0.015	1	<50%	400		
MDC Hwy 46	7/27/2008			7					480		8.66								
	8/27/2008			8		740			1260		9.18							29	40

2009 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Ammonia Nitrogen mg/L	pH	Temp C	Conductivity umhos/cm	Chlorpyrifos ug/L	Dimethoate ug/L	Ceriodaphnia Bioassy % Survival	Fecal Coliform MPN/100ml
					10	700	10	700	450	1.5	6.5-8.3		700	0.015	1	<50%	400
MDC Hwy 46	2/18/2009					900			1260								
	5/27/2009					996			1380								
	6/29/2009			20					610								
	8/27/2009			4					1190		8.97						
	9/29/2009			4		1002			1410								

2010 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Ammonia Nitrogen mg/L	pH	Temp C	Conductivity umhos/cm	Chlorpyrifos ug/L	Dimethoate ug/L	Ceriodaphnia Bioassy % Survival	Fecal Coliform MPN/100ml
					10	700	10	700	450	1.5	6.5-8.3		700	0.015	1	<50%	400
MDC Hwy 46	1/26/2010					1260			1510					0.019			2420
MDC Hwy 46	2/21/2010					1210			1770		8.63						1550
MDC Hwy 46	3/24/2010					2580			2410		8.32			0.06			
MDC Hwy 46	4/27/2010					1200		1557	970		8.85			0.12			
MDC Hwy 46	5/19/2010													0.08			
MDC Hwy 46	7/14/2010										8.36			0.06			
MDC Hwy 46	8/25/2010													0.34			
MDC Hwy 46	9/29/2010					1150		2340	1560					0.05			
MDC 7th Standard	3/24/2010							1425						0.092			
MDC 7th Standard	4/27/2010							1587						0.077			
MDC 7th Standard	5/19/2010													0.076			
MDC 7th Standard	6/24/2010													0.023			
MDC 7th Standard	7/27/2010													0.19			
MDC 7th Standard	8/25/2010													0.35			
MDC 7th Standard	9/29/2010							1435						0.05			

2011 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Sample ID	Testing Lab	Measured Flows (CFS)	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Conductivity umhos/cm	TDS mg/L	Ammonia Nitrogen mg/L	pH	Temp C	Conductivity umhos/cm	Chlorpyrifos ug/L	Dimethoate ug/L	Ceriodaphnia Bioassy % Survival	Fecal Coliform MPN/100ml
					10	700	10	700	450	1.5	6.5-8.3		700	0.015	1	<50%	400
MDC Hwy 46	1/27/2011	VI 1140171-001	FGL	0							8.79						
MDC Hwy 46	2/24/2011	VI 1140422-001	FGL	18													1300
MDC Hwy 46	3/30/2011	VI 1140701-001	FGL	0	25.4	702	41.3	1500	929				1486	0.053			
MDC Hwy 46	4/25/2011	VI 1140858-001	FGL	25	11.3									0.072			
MDC Hwy 46	5/31/2011	VI 1141154-001	FGL	44													
MDC Hwy 46	6/29/2011	VI 1141396-001	FGL	24													
MDC Hwy 46	7/28/2011	VI 1141676-001	FGL	11	13.4									0.32	1.3	45	500
MDC Hwy 46	8/31/2011	VI 1142103-001	FGL	47	13.3									0.53		0	900
MDC Hwy 46	9/29/2011	VI 1142374-001	FGL	30										0.16			
MDC Hwy 46	12/28/2011	VI 1143237-003	FGL	14	11.9		11.7	946	552				1080	ND			
MDC 7th Standard	1/27/2011	VI 1140171-003	FGL					1990	1260				1982				
MDC 7th Standard	2/24/2011	VI 1140422-003	FGL														17000
MDC 7th Standard	3/30/2011	VI 1140422-003	FGL														
MDC 7th Standard	4/25/2011	VI 1140858-003	FGL		11									0.13			3000
MDC 7th Standard	5/31/2011	VI 1141154-003	FGL		11.6									0.058			
MDC 7th Standard	6/29/2011	VI 1141396-003	FGL		18.1												5000
MDC 7th Standard	7/28/2011	VI 1141676-003	FGL		11.6					1.9				0.29		35	8000
MDC 7th Standard	8/31/2011	VI 1142103-003	FGL		11.9									1.4		0	2200
MDC 7th Standard	9/29/2011	VI 1142374-003	FGL		13.5	1130	23.8	2170	1370				2041	0.51			500

2012 Main Drain Water Quality Exceedances

Sample Location	Sample Date	Lab ID	Testing Lab	Measured Flows (CFS) *Water Delivery	Arsenic ug/L	Boron ug/L	Molybdenum ug/L	Selenium ug/L	Conductivity umhos/cm	TDS mg/L	pH	Dissolved Oxygen mg/L	Conductivity umhos/cm	Chlorpyrifos ug/L	Diuron ug/L	Fecal Coliform MPN/100ml
					10	700	10	5	700	450	6.5-8.3	>5	700	0.015	2	400 (235)
MDC Hwy 46	1/25/2012	VI 1240155-001	FGL	9	16.1	1080	16.7		2070	1290		3.03	2075			
MDC Hwy 46	2/28/2012	VI 1240408-001	FGL	3	17.2	793	22.4		2020	1220	8.99		1870			
MDC Hwy 46	3/28/2012	VI 1240634-001	FGL	< 1	14		13.1	5.76	1280	814	9.09		1200	0.026	8.2	
MDC Hwy 46	4/25/2012			5												
MDC Hwy 46	5/23/2012	VI 1241050-001	FGL	8	26.0	1060	19.7		2130	1340						
MDC Hwy 46	6/27/2012	VI 1241341-001	FGL	27	11.2				872	482						
MDC Hwy 46	7/31/2012	VI 1241662-001	FGL	7	12.3							4.13				700
MDC Hwy 46	8/30/2012	VI 1242091-001	FGL	8	12.8		11.3		983	573						
MDC Hwy 46	9/27/2012	VI 1242302-001	FGL	2	11.5	1870	34.8		3240	2020		4.10				
MDC Hwy 46	10/30/2012	VI 1242644-001	FGL	7							9.33					
MDC Hwy 46	11/27/2012	VI 1242889-001	FGL	6							8.34					
MDC 7th Standard	1/25/2012	VI 1240155-003	FGL		14.7		10.5		1350	895			1348			3000
MDC 7th Standard	2/28/2012	VI 1240408-003	FGL		14.1		11.7		1670	1040			1551			50000
MDC 7th Standard	3/28/2012	VI 1240634-003	FGL		12.7		14.1	6.35	1100	677	9.06		1204	0.12		24000
MDC 7th Standard	4/25/2012															
MDC 7th Standard	5/23/2012		FGL		14.9	912	13.1		2110	1370						
MDC 7th Standard	6/27/2012	VI 1241341-003	FGL		11.6				745							
MDC 7th Standard	7/31/2012	VI 1241662-003	FGL													1300
MDC 7th Standard	8/30/2012	VI 1242091-003	FGL		12.3											
MDC 7th Standard	9/27/2012	VI 1242302-003	FGL		14.6				1080	713						2200
MDC 7th Standard	10/30/2012	VI 1242644-003	FGL		11.7				908	574						

2013 Main Drain Water Quality Exceedances

[illegible]

2014 Main Drain Water Quality Exceedances

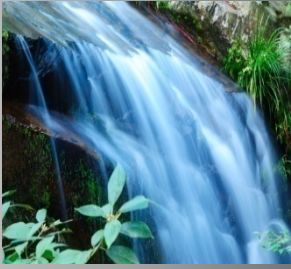
[illegible]

APPENDIX F

BSK Associates Engineers & Laboratories

Statement of Qualifications

Engineering and Analytical Services



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Corporate Summary



BSK provides consulting engineering and testing for clients with projects ranging in size from small to complex, in both natural and built environments.

Celebrating over 45 years, BSK is employee-owned, and has grown to a staff of more than 150 with offices, laboratories, and sample drop-off locations throughout California (Livermore, Sacramento, Fresno, Visalia, and Bakersfield).

SERVICES:

- Civil and geotechnical engineering
- Hydrogeology services
- Geospatial services
- Environmental engineering
- Construction observation and materials testing
- Ecological/Biological consulting
- CEQA and NEPA consulting
- Engineering geology
- Brownfields consulting
- Land reuse and redevelopment planning
- Water resources management
- Analytical chemistry

MARKETS SERVED

Transportation	Energy	Water	Commercial/Retail
Agriculture	Wineries	Healthcare	Higher Education
Telecommunications	Government	Aggregate/Mining	Industrial
Redevelopment	Brownfields	Land Use Planning	K-12

OUR COMPANY VALUES

Service – We believe in meeting our commitments to our clients and our colleagues, and achieving quality in performance, communication, comportment and project deliverables.

Professionalism – We believe in acting in the best interest of our client and the company with complete honesty and respect. We value competency in the performance of our services and integrity in our opinions and advice.

Employee Development – We value professional development and personal achievement through coaching, mentoring, and a balance between a challenging and rewarding work environment and quality of life with family and friends.

Personal Accountability – We value personal commitment to execution, follow-through and ownership of every task and process.

Teamwork – We value collaborative effort consisting of individual participation, open communication, mutual respect and shared success.

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Service Overview

ANALYTICAL LABORATORIES

BSK analytical laboratories is a full-service, California Department of Health Services-certified laboratory offering a wide range of organic and inorganic analyses for wastewater, drinking water, soil, hazardous materials. We are certified under both the California Environmental Laboratory Accreditation Program (ELAP) and California NELAP programs. We are also certified in the states of Nevada and New Mexico and are one of the few firms in the United States approved by the EPA to perform all methods required by the UCMRI, UCMRII, and UCMRIII programs.

ENVIRONMENTAL ENGINEERING, ECOLOGICAL SERVICES, WATER RESOURCES

BSK environmental consulting services range from due diligence Phase I & II, biological & ecological studies, CEQA/NEPA support, Brownfields, feasibility studies, and water supply assessments at site selection, to assessment, remediation, waste characterization, and treatment design. We routinely provide environmental site investigations, groundwater monitoring and remediation, site closure planning and implementation, risk assessments, reclamation programs, natural resource planning and auditing for regulatory compliance.

GEOTECHNICAL ENGINEERING, ENGINEERING GEOLOGY

BSK has provided geotechnical services for more than 40-years and offers in-depth knowledge and experience relative to earth pressures and their impacts on foundations, pavements, retaining walls, pipelines, and structures. Our geotechnical capabilities include feasibility studies, site evaluations, soil stabilization studies, construction engineering, foundation designs, rippability and grading recommendations, excavation and dewatering consulting, seismic hazards investigations and earthwork observations during construction.

MATERIALS TESTING AND CONSTRUCTION OBSERVATION

BSK construction services group provides quality assurance/quality control observation, monitoring and testing of construction materials in accordance with International Building Code (IBC) and California Building Code (CBC) Section 1704A.1.1. We are knowledgeable of construction materials including aggregates, asphalt, reinforced steel, structural steel, concrete, masonry, fireproofing, and are familiar with construction processes and methods. Our project experience has ranged in complexity and size, and throughout California.



Safety Overview



BSK values the health and safety of our employees. The goal of our safety program is to provide a safe and injury-free workplace for our employees, reduce risk and loss to the company, and to be compliant with regulatory laws. We identify our safety program as a core component of our culture where safety comes first.

Our program is supported by all levels of management and is summarized by our President Richard Johnson's adopted safety message ... ***"Safety First is Safety Always"***...

Our safety program is reenforced through:

- Safety moments beginning every meeting.
- Daily & weekly field safety briefings.
- Monthly safety meetings at all offices.
- Internal announcements regarding safety topics.
- Routine site visits and office assessments.

Our safety program promotes the health and well-being of our employees by preventing injuries and accidents in the workplace. The program involves active participation from all employees with the goal to create an environment where our employees are personally committed to workplace safety.

Our safety program includes the following elements, which are overseen by our full-time Director of Safety.

- Injury & illness protection program
- Hazard communication program
- Medical surveillance program
- Respiratory protection program
- Driver safety
- Hearing protection
- Forklift safety
- Radiation safety

The success of BSK is dependent on our employees working safely and injury-free everyday, so we can provide excellent value, exceptional service and creative solutions to our clients.



Representative Clients



Client	Environmental	Geotechnical	CoMET	Analytical
Berry Petroleum		Δ	Δ	
SunEdison	Δ	Δ	Δ	
Conergy		Δ	Δ	
AT&T			Δ	
DTE Energy		Δ	Δ	
San Joaquin Refinery	Δ	Δ		
OLAM	Δ			
Southern California Edison			Δ	
U.S Pipe	Δ			
Vintage Production California, LLC		Δ	Δ	
Safeway Inc.				Δ
PG&E	Δ			Δ
Land O' Lakes	Δ	Δ	Δ	
University of California, Berkeley		Δ	Δ	
Republic Services				Δ
CEMEX U.S.A	Δ	Δ		
Vendo Company	Δ			
University of California, Davis			Δ	
Adventist Health		Δ		
Vulcan Materials Inc.	Δ	Δ		Δ
Dignity Health (Formerly CHW)		Δ	Δ	
Kaiser Permanente		Δ	Δ	
99 Cent Only Stores			Δ	
Sutter Health		Δ	Δ	
VA Medical Center		Δ	Δ	
Solano County Water Agency	Δ			
Waste Management	Δ			Δ
Veolia Water Company				Δ
Constellation Wines	Δ			Δ
Granite Construction	Δ	Δ	Δ	Δ
Southwest Water				Δ
Parsons Technology		Δ	Δ	
California American Water				Δ
Metro PCS			Δ	
Lehigh Cement	Δ			
Foster Farms				Δ
AECOM		Δ	Δ	Δ
City of Fresno	Δ	Δ	Δ	Δ
Pick N' Pull	Δ			
AC Transit			Δ	
Quad Knopf Inc.	Δ	Δ	Δ	
Jacobs Engineering		Δ	Δ	
County of Alameda		Δ		
Fresno County	Δ	Δ	Δ	Δ
Sacramento County				Δ
City of Pleasanton	Δ	Δ	Δ	

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Representative Projects

Southern California Edison

Southern California Edison is one of the largest electric utilities in the United States. Over the past five years, BSK has provided geotechnical and materials testing/inspection services to Southern California Edison. Currently, BSK is performing testing and inspection services on power transmission line foundations of varying types for both the Tehachapi Renewable Transmission project and San Joaquin Cross Valley Loop Transmission project.



San Joaquin Refinery

BSK was tasked to perform environmental consulting regarding remediation approaches for the San Joaquin Refining Company. BSK's multi-disciplinary approach provided a cost-effective definition of the geology, hydrogeology and petroleum hydrocarbon distribution, facilitating an evaluation of remedial alternatives. The research resulted in confirmation of our proposed in-situ bioremediation program as an innovative and cost-effective remedial approach. Prior to the installation of treatment wells and remediation equipment, BSK prepared a work plan to guide the implementation of a pilot study to determine the optimal specifications for wells and remediation equipment.



U.S. Federal Courthouse

BSK was the Geotechnical Engineer-of-Record and conducted the Geologic Seismic Hazards Assessment for this 61,000 SF. multi-story complex located on a 4-acre re-developed area of downtown Fresno. The L-shaped building consisted of two wings: the "P" Street wing was seven-level above-grade and a roof about 150 feet above grade; the other wing was nine levels above-grade with a roof/penthouse level about 194 feet above grade. There was also a single level basement/parking structure which extended about 18 feet below grade. The structure was a movement-resistant steel frame with maximum column loads 1800 to 2,500 kips and wall loads of 6 to 8 kips per lineal foot.



Yolo County, Cache Creek Resource Management & Improvement Plans

BSK provided technical advising, field studies, mapping and analysis of over 14 miles of natural landscapes, including wetland delineations, to meet state and federal permitting requirements for a multi-use Management Plan. BSK also supported detailed ecological analyses of the weed management program and riparian vegetation re-establishment, as well as LiDAR and aerial photo analysis of the channel for use by the Geomorphologist. In addition, BSK researched and wrote the Biological Assessment for the riparian corridor, to be used toward renewal of the Cache Creek Regional General Permit #58.



Representative Projects

Sierra View District Hospital

For more than 20 years, BSK has provided geotechnical engineering, geologic/seismic services and construction inspection and testing services for Sierra View District Hospital. Because the foundation system design must address the potential for liquefaction of the underground sand deposits, BSK recommended conventional continuous and isolated spread footings be used to provide adequate bearing support and moderate settlement. When liquefaction had to be mitigated to further reduce settlement, drilled piers founded atop the very dense gravel and cobble zone at depths below 30 feet or a structural mat foundation were recommended.



ValleyCare Medical Center New Addition

BSK was retained by Valley Memorial Hospital to provide special inspection and materials testing services for 100,000 square foot, multi-level, steel frame hospital addition. Our services included verifying compliance with the approved documents and coordinating inspections with the work flow. Services also included coordination of the special inspection portions of the work, monitored special inspection work progress and verification of inspection invoices for substantiation of the services provided.



State Center Community College

BSK performed the geotechnical investigation and seismic hazards report for Construction Phase I of the Willow/International State Center Community College District Campus. BSK also completed a geotechnical investigation report and seismic hazards report for Phase II of the project. The first phase of the project consisted of ten classroom buildings and the Child Development & Central Plant Building. Phase II of the site development consisted of a two-story, steel frame structure with a concrete slab-on-grade floor and measures approximately 49,500 square feet and is partially surrounded by concrete flatwork. Foundation types include conventional spread footings and vertical Cast-In-Drilled-Hole piers.



White Lane at State Route 99

BSK provided geotechnical investigation and materials testing services for this extensive project. Improvements included widening of the overcrossing's south side to accommodate six lanes of traffic, and an auxiliary lane eastbound-to-northbound onramp. The project also included reconstruction of all northbound ramps; a traffic signal at the northbound off ramp intersection; a northbound auxiliary lane on State Route 99, interchange landscaping and irrigation, and a reconstruction of the eastbound-to-southbound onramp.



Representative Projects

Arvin-Edison Water Storage District (AEWSD)

Over many years, BSK has provided geotechnical investigation and materials testing services to AEWSD to evaluate sites from a geotechnical standpoint and determine the general suitability of the proposed construction. This has included field exploration, laboratory testing, engineering evaluations, and report preparation. BSK also provided construction material testing for multiple sites with structures being added or expanded.



Folsom Spillway

The project consists of constructing an auxiliary spillway to allow water to be released earlier and more safely from Folsom Lake during a high water event. Key features of the project include a control structure containing six submerged flood gates, a 3,000-foot spillway chute and a stilling basin, and a 1,100-foot approach channel. BSK assisted Granite Construction with designing and permitting the storm water management program for the 110-acre, Risk Level 3 project. The program consisted of conducting a hydrologic assessment to evaluate storm water runoff quantities, designing containment berms and settling basins, and developing the Storm Water Pollution Prevention Plan.



Fresno Metropolitan Flood Control District

BSK has been supporting the Fresno Metropolitan Flood Control District (FMFCD) since 1977, successfully completing nearly 50 projects. Our services include geotechnical investigations, environmental, construction testing and inspection as well as analytical testing. BSK has worked on various FMFCD projects such as levees & canals, storm water systems, water supply systems, detention basins, dams, as well as roads and pipeline infrastructure. Specific tasks have included; FEMA Levee Certifications, Basin Feasibility Assessments, Chemical and Laboratory testing as well as Construction Monitoring & Observation.



Sierra Way Road Reconstruction, Lake Isabella

BSK provided geotechnical investigation, slope stability, seismic investigation/analysis, and construction materials testing and observations. The reconstruction involved removing slide debris from the damaged slope, excavating to competent material and rebuilding the embankment.



Analytical Services



Analytical laboratory test results are the underlying foundation for all regulations that protect our health and our environment. Without these results, there would be no information to ascertain the safety of our water, soil and air and its influence on the world around us. Given the inherent importance of reliable test results, these methodologies must be performed by educated, experience professionals using the latest equipment and following industry standards for technical competence.



BSK Associates' Laboratory Service Division (BSK Labs) was established in 1967 as a support service for our Engineering Division. However, BSK Labs has grown in its own right to become one of the top analytical testing laboratories in the State of California. BSK Labs employs over 55 technical professionals with degrees in chemistry, biology and microbiology. Our staff understands and appreciates the significance of the results they produce, recognizing their importance to the environment in which we live.



BSK Labs provides a broad range of testing services to a variety of markets. BSK specializes in potable water quality chemistry, wastewater compliance and solid waste characterization. We also offer fuel characterization services to the biomass energy industry and have provided specialty analytical services on a variety of complex, forensic investigations where standardized methodologies may not apply.

BSK labs have provided our testing solutions to:

- Public and private drinking water systems
- Wastewater treatment facilities
- Irrigation, reclamation and conservation districts
- Water banking and storage agencies
- Environmental engineers
- Hazardous materials treatment, storage and disposal operations
- Biomass energy production plants
- Food processing facilities
- Mining operations

Environmental Services



COMPREHENSIVE SOLUTIONS

Continuing concern for the environment has driven local, state, and federal governments to enact new and ever-changing laws and regulations. Our clients depend on BSK to help them through the maze of permitting and regulatory compliance requirements. The professional staff at BSK provides comprehensive solutions to environmental problems.

BSK has the ability to manage projects from initial site assessments through the design and implementation of cost-effective remediation systems. Restoring air, water, and soil quality to meet the objectives of our clients and achieving regulatory compliance is our number one goal. Our solutions often turn environmental liabilities into assets.

BSK has environmental assessment and remediation experience including work at Superfund sites, landfills, underground storage tank sites, and metals and pesticide-contaminated sites. We have successfully performed environmental projects for clients such as:

- State & local agencies
- Oil & gas companies
- Solid waste facility operators
- Financial institutions
- Developers
- Farming & agricultural concerns
- Food processors & manufacturers
- Dry cleaners
- Wineries
- Aggregate & mining operations

Our services include:

- Permitting & regulatory compliance
- Natural resource assessments
- Phase I environmental site assessments
- Remediation system design & operation
- Environmental impact reports
- Water supply analysis
- Solid waste disposal sites analysis
- Land reuse planning
- CEQA/NEPA support
- Brownfields revitalization consulting



Brownfields Revitalization Consulting



Returning abandoned Brownfields properties to vital real estate can be a daunting task. BSK's emphasis on obtaining and using Brownfields funding tools can convert blighted areas into areas of economic opportunity. Our team is nationally recognized for their contributions to Brownfields development practices. We have been supporting clients for over ten years by obtaining funds, developing technical solutions, creating reuse planning, and addressing legal and regulatory concerns.

Our team niche for writing award winning U.S. Environmental Protection Agency grants has resulted in over \$2.5 million for California communities to leverage additional funds and private sector interest.

We focus results in:

- Award winning grant applications
- Grant management and reporting
- Effective community outreach and planning
- Inventory and priority of sites in GIS format
- Comprehensive Phase I and Phase II investigations
- CEQA/NEPA and other environmental analysis
- Cleanup planning integrating with Best Reuse Plans
- Cost saving cleanup actions

We work with communities, owners, developers, and regulators to identify the critical path to achieve site closure by crafting reuse plans to properly prioritize tasks, reduce costs, and shorten schedules. We rely on innovative technologies and the highest quality data in approaching investigations and remediation. As collaborative partners, we count on BSK's laboratory scientists to craft data quality objectives and present timely and usable results.

Involving our ecological services, geotechnical engineers and legal associates provides a full picture for future reuse. With the demise of California's Redevelopment Agencies, local municipalities rely more than ever on the private public partnership to see projects to their end.



Abandoned Brownfields in every community impacts economic development.



BSK performed complex environmental engineering services turning this former Brownfields site into 3,000,000 square feet of developed land.

CEQA/NEPA & Permitting Services



STREAMLINED SUPPORT

The BSK California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) team works closely with lead/trustee/responsible agencies, project proponents, regulators, and stakeholders to achieve timely and cost-effective project approvals.

BSK's team of planners, engineers, ecologists, facilitators, environmental and earth scientists carefully assesses each project to identify the most streamlined approach to achieve the project purpose, including exemptions, exclusions, addenda, or tiering.

SEAMLESS PERMITTING

BSK's team provides a seamless, integrated approach, depending on each project's need, from initial Phase I Site Assessments, ecological reconnaissance, and relevant special studies to inform the CEQA and/or NEPA analysis.

BSK prepares DFW 1600 series permits, RWQCB 401 certification, USACE delineation, 404/408 permits, USFWS and NOAA-NMFS biological assessments, Section 7 and 10 coordination, and other permitting documents, mitigation and monitoring compliance, and WEAPs.

BSK specializes in defensible project findings, as well as carefully designed mitigation for project impacts which reduce litigation exposure.

LITIGATION SUPPORT

At times, litigation support is required to defend projects from petitioner's claims, or to address potential project impacts from the petitioner's perspective. BSK has experience with both approaches.



Ecological Services



RESPONSE TO CLIENT NEEDS

The BSK ecological team (ecologists, biologists, and environmental scientists) works closely with our earth scientists (geologists, geotechnical engineers, hydrologists, and chemists) and provides a seamless, integrated response to initial site reconnaissance, special studies, CEQA, and permitting documents, and through to site build-out.

POLICY AND STRATEGIC SUPPORT

BSK's ecological services include strategic support for legislative efforts and regional initiatives. Our team members have worked on state and federal projects ranging from Superfund (NPL), the recent California water legislation, to the Bay-Delta Mercury TMDL process.

STUDIES AND PERMITTING

Inventories of flora and fauna are necessary to establish permitting requirements, and in some cases develop appropriate habitat. BSK provides a variety of ecological services which assist our clients in gaining regulatory agency approval for project implementation. Our services include:

- State and federal permitting
- Mitigation, restoration, and monitoring plans
- Wetland and ordinary high water mark mapping
- HEC and channel migration modeling
- Channel design
- Construction monitoring to ensure compliance with plans and permits
- Monitoring the success of the mitigation and restoration plans

PROJECT AND PLANNING DUE DILIGENCE

BSK provides a wide variety of ecological services which assist our clients in gaining regulatory agency approval for project implementation. We offer creative solutions to land use assessment and planning issues. Ecological site screening for projects and development are often required for due diligence, and can save considerable time and money if the project moves forward.



Construction Inspection & Materials Testing



Our inspection personnel are selected for multi-disciplined knowledge and abilities. These qualifications allow them to perform multiple inspections concurrently – resulting in cost savings to our clients and projects.

LICENSED & CERTIFIED TECHNICIANS PROVIDE FLEXIBILITY AND CONSTRUCTION SAVINGS

With our commitment to excellence and continuing pursuit of technological advancement, BSK provides our clients quality construction inspection and materials testing. BSK's diversified personnel, backed by our certified testing laboratories, provide an inspection and testing program for all project requirements.

Members of our technical staff work under the supervision of Professional Engineers and are certified in various disciplines by the following agencies:

- American Concrete Institute (ACI)
- American Welding Society (AWS)
- California Department of Transportation (Caltrans)
- Division of the State Architect (DSA)
- International Code Council (ICC)
- National Institute for Certification in Engineering Technologies (NICET).

Our experienced technical personnel have provided special inspections for schools, public buildings, hospitals, and medical buildings on behalf of following organizations:

- Division of the State Architect
- Office of Statewide Health Planning and Development
- U.S. Bureau of Reclamation
- U.S. Department of the Interior

In addition to providing quality assurance in accordance with the California Building Code, Section 1701, we have also developed quality control plans and work plans for states, the U.S. Navy, and the U.S. Army Corps of Engineers.

BSK has provided services to the following markets:

- Transportation
- Water
- Commercial/Retail
- Healthcare
- Education
- Telecommunications
- State & Local Governments



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BSK materials testing laboratories are inspected by the Cement and Concrete Reference Laboratory (CCRL), AASHTO Materials Reference Laboratory (AMRL), the California Department of Transportation (Caltrans), and the U.S. Army Corps of Engineers. Our laboratories are also approved by the Division of State Architect under Testing Inspection Agency Evaluation and Acceptance process for compliance with ASTM E-329.



BSK's material testing laboratories, in conjunction with our civil engineers, provide concrete mix design, development, and testing; asphalt mix design, development, and testing; and welding procedure development testing.

BSK has multiple materials testing laboratories with capabilities to perform applicable tests. Our field and laboratory crews routinely use destructive and non-destructive testing equipment for testing of:

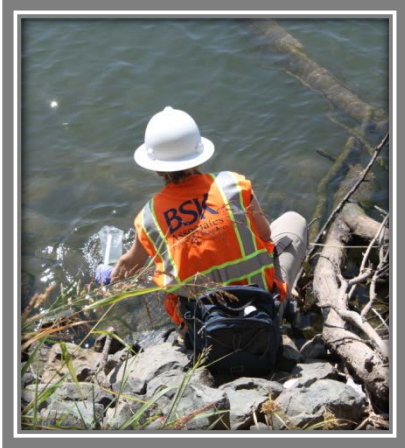
- Concrete
- Shotcrete
- Structural steel
- Asphalt concrete
- Structural masonry
- Soils and aggregates
- High strength bolts
- Structural steel welding
- Floor flatness
- Reinforcing steel
- Built-up roofing
- Proof loads
- Soil compaction
- Permeability of soil, concrete and rock cores
- Non-destructive reinforcing steel location

ENGINEERS WITH DIVERSE EXPERIENCE PROVIDE FAILURE AND DAMAGE CLAIM INVESTIGATIONS

BSK's civil and geotechnical engineers combine professional training with construction consultation experience to evaluate a broad range of failures and damage and injury claims. BSK provides field investigations, testing laboratory services, professional reports, deposition statements and/or deposition consultation and expert testimony. BSK's forensic investigation clients include:

- Insurance and finance
- Government agencies
- Developers
- Attorneys
- School districts
- Contractors

Construction Storm Water Services



Developers and contractors can be challenged by the abundance and complexity of storm water regulations mandated by federal and state agencies. BSK provides turnkey professional industrial and construction Storm Water Pollution Prevention Plan (SWPPP) assistance to our clients throughout California. BSK's storm water services compliment our engineering services by providing clients with a team of specialists that take your project from planning through post-construction.

Our construction storm water staff are Qualified SWPPP Developers (QSDs) and Qualified SWPPP Practitioners (QSPs), as required by the current state construction permit. Our QSDs and QSPs are fully trained and qualified to assist you on Risk Level 1, 2, and 3 traditional projects, as well as Type 1, 2, and 3 linear underground projects.

Permitting and SWPPP Preparation Services: Our SWPPP services include:

- Preparation and submittal of the notice of intent and related permit registration documents.
- Evaluate projects with regard to current storm water regulations and prepare a site-specific SWPPP.
- SWPPP awareness and field training.

Our goal is to make the permitting process smooth and seamless so our clients can focus on their primary business concerns.

SWPPP Implementation Services: BSK provides qualified staff with the necessary certifications to implement and maintain your SWPPP. This includes:

- Updating BMP drawings, reviewing and amending the SWPPP as necessary, and conducting site inspections.
- Performing storm water sampling and laboratory analysis.
- Providing regular weather updates to alert you to any predicted rain event.
- Preparing rain event action plans.



Geotechnical Engineering



FOCUSED APPROACH PROVIDES COST SAVINGS

A detailed geotechnical investigation can provide the basis for cost savings in foundation design and long-term building maintenance. BSK produces studies with accurate understanding of soil conditions and engineering properties. Our objective is to provide clear and concise reports which accurately represent soil conditions, instead of overly conservative values resulting from insufficient test data.

Our geotechnical engineers, and engineering geology staff, have conducted studies for:

- Highways, airports, roads & bridges
- Water & wastewater treatment facilities
- Hospital & medical buildings
- Office & retail complexes
- Water storage and delivery systems
- Commercial and industrial developments
- Solid waste management facilities
- Schools
- Dams & levees
- Telecommunication towers & facilities
- Parks & recreation facilities

BSK's expertise is valued by our clients from the preliminary planning stages of a project through design and construction. Our involvement in geotechnical engineering and the construction support phases of the project, means changing conditions can be addressed in a timely fashion, reducing costly project delays. Quality and efficiency is heightened by providing a seamless transition from one phase of the project to the next.

Additionally, by providing geotechnical review during construction, field crews have direct access to the engineering staff, allowing for immediate action on any unexpected site conditions.

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BSK's Geotechnical Engineering Services include:

- Geotechnical site evaluations
- Soil and foundation investigations
- Excavation dewatering
- Soil stabilization studies
- Rippability and grading feasibility studies
- Landfill liner and cover design
- Construction engineering
- Pavement design
- Construction inspection

IN-HOUSE SOIL TESTING IMPROVES RELIABILITY AND DECREASES TURNAROUND TIME

To take continuity one step further, our engineering office contains a soils testing laboratory which enables our Geotechnical Engineers to direct, observe, and participate in the testing programs. This greatly improves the reliability of the laboratory test data. As an added benefit, our three conveniently located soils testing laboratories can respond quickly and efficiently, even with tight schedules.

Our laboratory capabilities include:

- Full range of strength tests
- Bearing ratio and R-value tests
- Expansion and consolidation testing
- Particle size analysis, sand equivalent, and plasticity determination.
- Permeability testing

Hydrogeology Services



An understanding of hydrogeologic conditions is fundamental in evaluating the quality and quantity of water supply and for determining an adequate and appropriate solution for contaminated sites. BSK has completed a variety of surface water and groundwater hydrogeology projects, including water resource studies and contaminant investigations. Our experience includes projects in environments as hydrogeologically diverse as the soft muds of the San Francisco Bay Area and the dry, collapsing sands of California's Central Valley.

BSK has developed efficient investigative methods tailored to each site. Our staff designs infiltration basins for large-scale, long-term storm water detention studies. The design requirements take into consideration the specific soil types and groundwater conditions at the site. We use investigative methods, ranging from basic hydrogeological measurements to sophisticated computer modeling, using data collected during field investigations.

Our services include:

- Groundwater exploration
- Water quality investigations
- Water supply well design and construction
- Safe yield studies
- Aquifer testing
- Groundwater modeling
- Wellhead protection
- Aquifer recharge

BSK's water resources experience ranges from single-well projects to aquifer- and basin-wide evaluations. As part of our water resources experience, we have successfully designed and sited several water recharge basins and water supply systems throughout Central and Northern California.

BSK has conducted hydrogeologic investigations and characterized contamination at a wide variety of sites including commercial/industrial facilities, sanitary landfills, agricultural/agribusiness facilities, and service stations.

We have characterized shallow single aquifers to deep multiple-aquifer systems, evaluating the distribution of subsurface contaminants and determining cost-effective remediation options. Additionally, we have conducted wastewater/storm water infiltration studies to determine the feasibility of using sites for wastewater or storm water disposal.

Water Resource Services

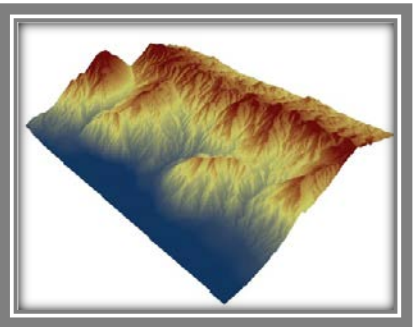


BSK has more than 45 years of experience in water resources investigations related to hydrogeology, hydrology, and water quality. This expertise includes water resources investigations for agricultural concerns, proposed land developments, siting and expansion of facilities, and construction of infrastructure.

BSK's water resources, geochemistry, and geologic experience has been demonstrated by projects situated in a variety of Western physiographic settings including low and high desert, intermountain valleys, coastal, and mountainous terrains. The different geologic characteristics of each setting presents complex groundwater flow and water quality considerations.

BSK's broad range of water resources capabilities includes:

- Recycled water
- Salinity and nutrients characterization
- Surface water hydrology
- Watershed delineation
- Water resources planning
- Flood hazard mapping
- Water use efficiencies
- Automation
- Water policy
- Litigation support



BSK's wide range of water resources services also include CEQA/NEPA support, riparian and wetland ecology, wetlands mapping, and watershed restoration.

BSK's water resources services are integrated with BSK's geospatial capabilities that include remote sensing (airborne and satellite imagery interpretation), Geographic Information Systems, and Global Positioning Systems data collection.



Geospatial Services



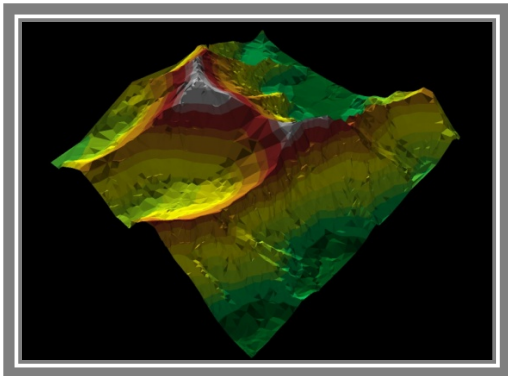
SOLUTIONS TO MULTI-DISCIPLINARY DATA

In today's data intensive environment, Geographic Information Systems (GIS), are the primary tools used by BSK for spatial data analysis. Use of GIS allows BSK to augment our other areas of investigation using advanced spatial tools and data sets.

GIS transforms the traditional engineering project by synthesizing environmental, geologic, geotechnical, water quality, and customer data. GIS provides a better means to visualizing data for forecasting and planning applications.

BSK applies GIS technology for projects that are multi-disciplinary requiring the collaboration of data from:

- Geotechnical soil classifications
- Seismic investigations
- Environmental monitoring
- Analytical test results
- Quality and quantity of water resources
- Lidar
- HEC-RAS



BSK's value engineering and GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared.